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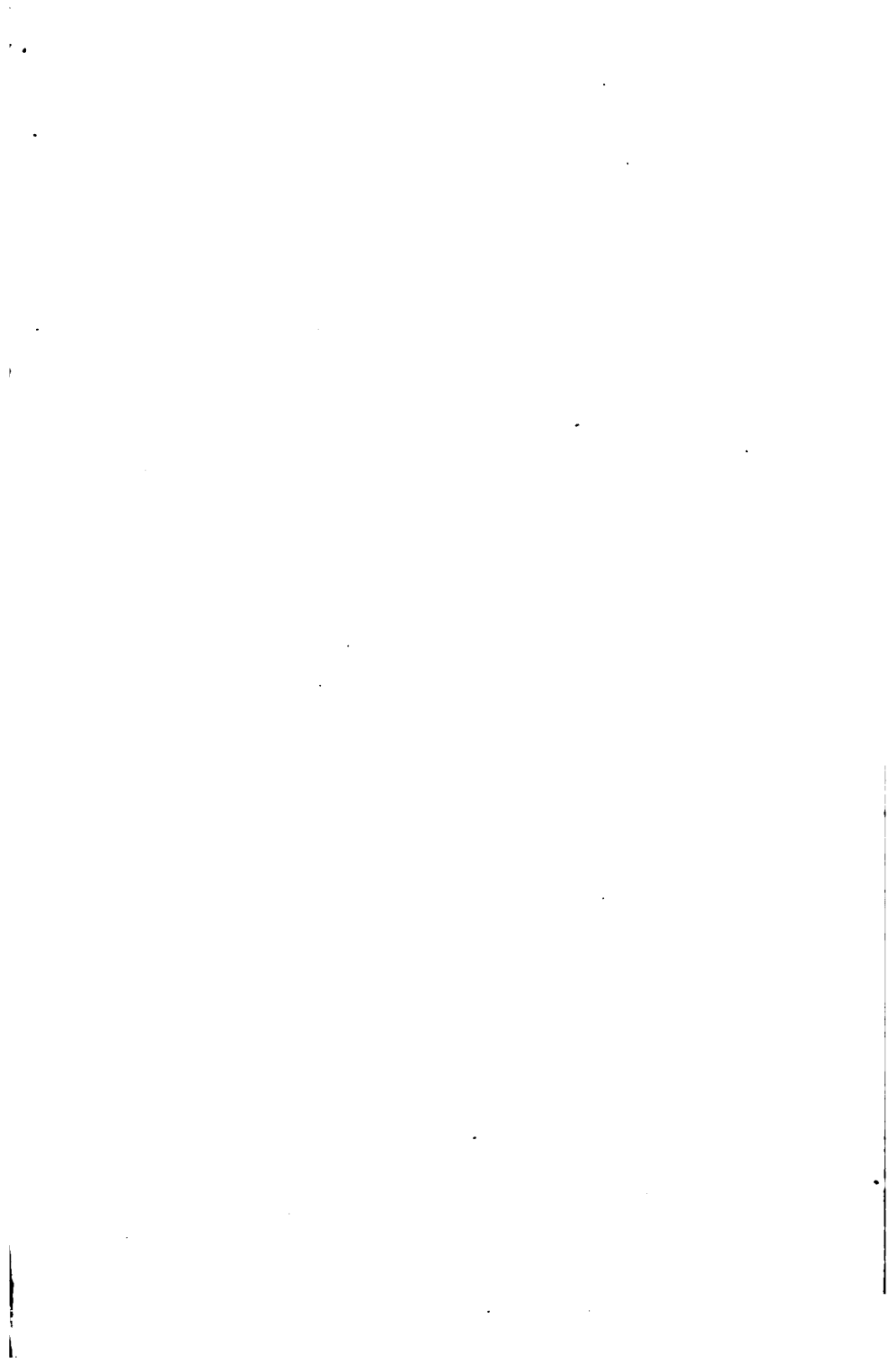
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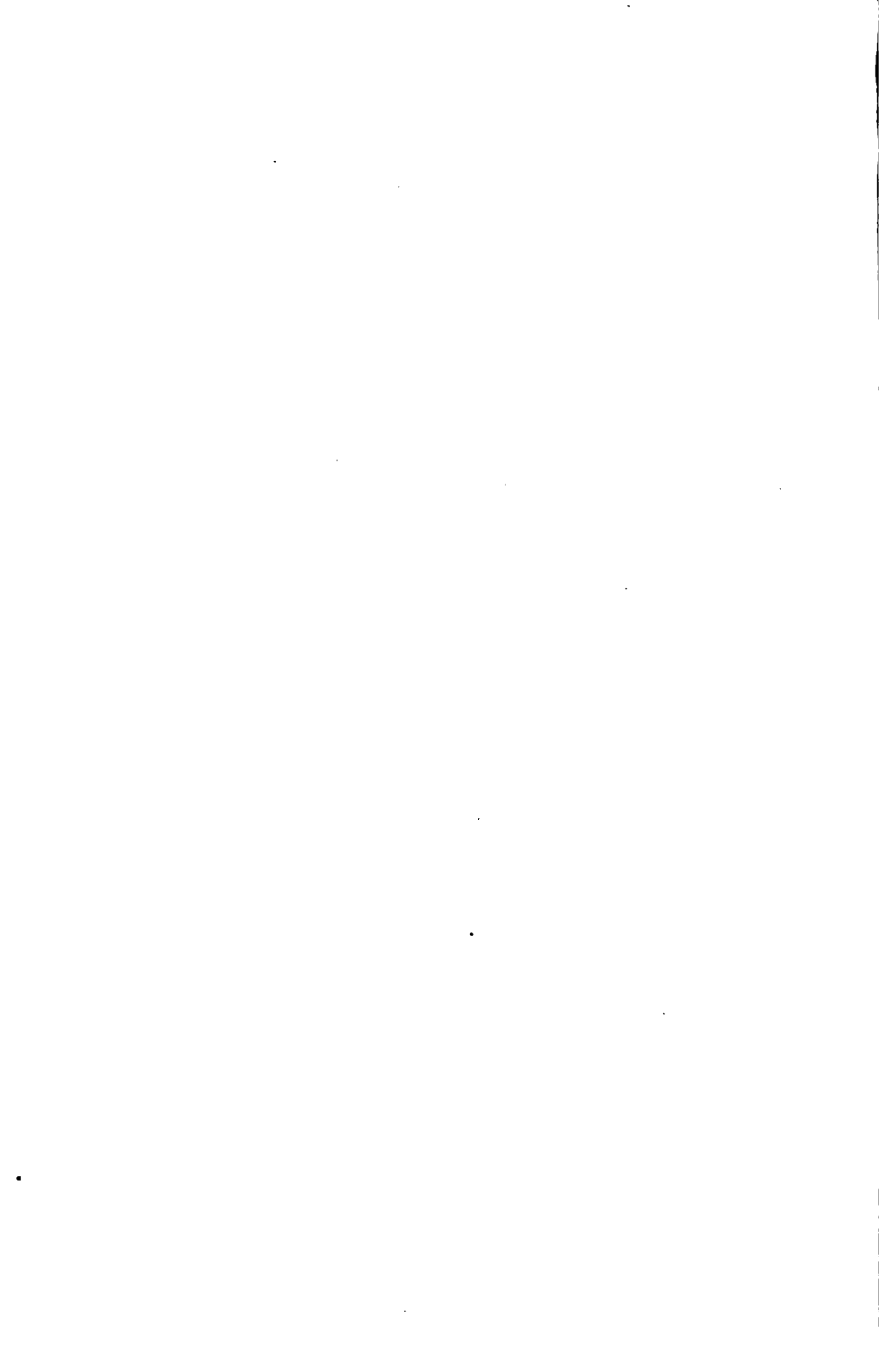


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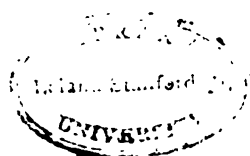
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THE PROCEEDINGS
OF THE
LINNEAN SOCIETY
OF
NEW SOUTH WALES.

MONDAY, 28TH JANUARY, 1878.

W. J STEPHENS, Esq., M.A., President, in the Chair.

MEMBER ELECTED.

MR. MISKIN, Queensland.

DONATIONS.

From La Société Entomologique de Belgique:—

Compte Rendu of the Society. Part 43 of Serie II.

From the Royal Norwegian Society of Christiania:—

1. Index Supplimentum Locorum Natalium specalium Plantarum nonnullarum vascularium in Provincia Arctica Norvegiæ sponte nascentium quas observavit J. M. Norman.
2. Allelositismus af J. M. Norman.
3. Enumerantur muscorum quorandum rariorum sedes in Norvegia quas observavit R. Wulfsberg.
4. Forstmeister J. M. Norman's Beretning til Departmentet for det Indre om den i Wien i September 1873 Afholdte Kongres af Land—og Forstmænd.
5. Bidrag til Kundskaben om Vegetationen paa Nowaja Semlja, Waigatschöen og ved Jngorstrædet Meddelt af A. Blytt.

6. Christiania omegns Phanerogamer og Bregner med Angivelse af deres udbredelse samt en indledning om vegetationens afhængighed af underlaget af A. Blytt.

From Prof. Owen :—

On a new species of *Sthenurus*.

PAPERS READ.

Description of a new species of *PTILOTIS*, from Torres Straits.

By E. P. RAMSAY, F.L.S.

PTILOTIS GERMANA. sp. nov.

Adult male. The front and sides of the head, lores, throat and chest, and the margins of the shoulders on the under side, yellow; ear-coverts yellow, with a narrow stripe of black, commencing almost at the angle of the mouth, passing through them, and below which they are of a brighter yellow; under wing-coverts pale buff; chest, breast, and remainder of the under surface pale yellow, indistinctly striped down the centre with dull brown, centre of the abdomen and under tail-coverts citron yellow, the greater series of the under tail-coverts striped down the centre with brown; back of the head, hind neck, and all the upper surface of the body dull brown, with a faint tinge of olive on the rump; wings and tail dark brown all the feathers broadly margined on the outer webs with bright olive yellow; bill black, legs brown.

Total length, 5·5; wings, 3·1; tail, 2·5; tarsi, 0·8; bill from forehead, 0·7; from gape, 0·75.

Hab. Torres Straits.

This species comes close to *P. ornatus* (Gould), on the one hand from the stripes of the chest, but has not the blackish lores of that species; on the other hand it resembles *P. flavescens* of the same author, but may be distinguished from it by the dull brown of the back, and stripes on the under surface.

On an Australian variety of *NERITINA PULLIGERA*, Linn.

By the Rev. J. E. TENISON-WOODS, F.G.S., F.L.S., Cor. Mem.
Lin. Soc., N.S.W., &c.

The following new variety of *Neritina* was obtained by Robert Johnstone, Esq. (and sent to the Curator of the Sydney Museum) in the mountain streams of the Bellenden Kerr Ranges, Northern Queensland.

NERITINA PULLIGERA, var. *SULCATA*. n. s.

N. t. calyptriformis, crassa, tumida, viz obliqua, marginem versus latiore, periostraca olivacea, parum nitida, concolor, haud erosa, concinne induta; spira omnino occlusa; anfr. 2? regulariter oblique, conspicue, late sulcatis, sulcis rotundatis, lævib.; apertura polita, ampla, expansa, semilunari, luteo-aurantiacea, cæruleo-alba anguste marginata; area columellaris planata, intense cæruleo-atrata, ad apicem conspicue, lateque callosa; peristoma acutum, labro superne canaliculato, retroque curvato; labio acuto, dentibus parvis, inconspicuis, numerosis munitis. Operculum testaceum, olivaceum, politum, læve, vel tenuissime striatum, fasciis intensioribus spiraliter ornatum; apice postico, marginali.

Maj. diam. 24-30, min. 18-24, alt. 11-15, millim.

Shell cup-shaped, thick, a little oblique, tumid, broader towards the margin, neatly covered by an olive, slightly shining, periostraca, which is not eroded; spire altogether hidden; whorls two, regularly, obliquely broadly sulcate; sulci rounded, smooth; aperture polished, ample, expanded semilunar, yellowish orange, narrowly margined with blueish white; columellar area flattened, of an intense blue-black, with a conspicuous broad callosity behind; peristome sharp; labrum channelled above and curved back, lip sharp with many fine small teeth. Operculum testaceous, olive, shining, smooth, or very finely striate, and ornamented with dark bands; apex posterior and marginal.

This shell is a variety of *N. pulligera*, Linnæus, but the differences are that our shell is yellow, not purple in the throat; the aliform prolongation of the labrum is much less marked, in

fact is scarcely perceptible, and the shell is smaller. It must be admitted that these features are not more than slight, and from the fact that the fluviatile shells of Australia have a very wide range this may be a local variety. I have not, however, distinguished it as a species, and for those who think the characters sufficient it can stand as *N. pulligera* var. *sulcata*. *N. pulligera* is common in the Molluccas, Philippine Islands, and has been found in the Pacific Ocean, New Caledonia (?). There is a specimen in the Sydney Museum marked as from Guadalcanor. This variety is also closely allied to *N. petitti*, Recluz, to which it approaches in size, though it is smaller. The lip and columella differ in color and shape. In *N. petitti* it is of rich reddish brown, darker at the margins, but in this species it is light orange, &c., as described. There are four *Neritinae* described from Australia, viz., *N. tritonensis*, Le Gillon, densely reticulated; *N. auriculata*, Lam. (as from New Holland), broadly auriculate at each side of the aperture; *N. baconi*, Reeve, from Swan River, lineated or flexuously reticulated with black lines; *N. dringii*, Recluz, spirally branded with yellow. All the above are smaller than the present species or variety.

N. pulligera was described by Linnæus as a "smooth coarse shell with an excavated eye-like small spire; inner lip smooth crenated." With the above named author it was a *Nerita* and came under his section C, meant for a division with imperforate shells and toothed lips. According to him it appears to have been figured by our countryman Lister (tab. 143) by Seba (*Mus.* 3. t. 41, figs. 23-26) by Rumphius (*Mus.* tab. 22). Gmelin gives other references, notably to Born in his Catalogue of the Museum of the Empress of Austria in volume of plates, No. 17, figs. 9 and 10, and *Chemnitz* vol. 9, plate 124, figs. 1078, 1079. Gmelin also says that it inhabits the rivers of India and is from 14 to 16 lines long. He adds "shell hard, very finely striate transversely, pellucid black or brownish or reddish (*sic* in Turton's edit.); whorls two, one very large and terminating in an acute tooth; throat glabrous, polished, with a fine blue or whitish bottom, near the margin a broad fulvous band; inner lip ascending, glossy."

Blumenbach (*Nat. Hist.* p. 265) states that *N. pulligera* matures its offspring within the shell and carries them about with it, from which circumstance the name "*pulligera*" has been given. Müller (*Verm. Terr. et Fluv.* vol. 2, page 196), says that "the yellowish white granules which frequently occupy the back of the shell are the young of the Nerite as Rumphius shows. I have counted 235 in one specimen. But for the authority of Rumphius I should have taken them to be the ovules of some wandering anamalcule." The following is the passage in full:—"Grana quæ dorsum cochleæ frequenter occupant, esse ipsius Neritæ pullos, Rumphius docet; horum ducenta triginta quinque in uno specimine numeravi, ovalia, convexa, extus luteo albida, intus alba, moleculis referta, corpuscula hæc sæpe absterguntur, remanente in testa circulo ovali albo. Nisi obstaret auctoritas exactissimi Rumphii ovula peregrini animalculi putarem."

MELANIA ONGOIDES. n. s.

M. t. fusiformi turrita spira elata, decollata, periostraca pallidissima lutea aliquando induta, lineis rufis, undulosis longitudinaliter insignita; anfr. 6, convexis, declivibus, liris spiralibus quatuor regulariter cinctis, in spira liris nodosis et oblique subplicatis, sutura bene impressa; apertura oblongo-ovata, antice effusa, labro acuto, labio calcareo.

Long. 20, lat. 10, long. apert. 9, lat. 7. Common in the creeks near Bourke, Darling River. James Ramsay.

Shell fusiformly turreted, spire produced, decollate, sometimes covered with a very pale yellow periostraca, marked longitudinally with red undulating lines; whorls 6, convex sloping, regularly spirally girdled with four liræ; in the spire the liræ are distinctly nodose and obliquely subplicate, suture well impressed, aperture, oblong ovate anteriorly effuse, labrum acute, lip chalky.

This *Melania* comes very close in form and coloring to *M. onca*, Angas, which is found in the fresh water streams about Port Darwin, N. Australia. The difference in this species are:—

1. It is much smaller. 2. Conspicuously lirate. 3. The plaits are almost obsolete and rarely seen, except on the upper whorls.

As, however, all our freshwater shells have a very wide range, this may be a variety, and the observed differences are due to climate. The lat. of Bourke is about 30°, or nearly 600 miles N. W. of Sydney. The habitat of *M. onca* is from 14° to 12° S. of the Equator. I should mention, also, that the tropical species is covered with a dark olive periostraca, while *M. oncooides* has scarcely any, and of a light straw color.

EXHIBITS.

Mr. Ramsay exhibited two species of Pigeon, *Chrysæna victor* (Gould), and *Lamprolia victoriae* (F. & H.), from Fiji. Also various Crotons, showing remarkable variations in foliage and color, from Duke of York Island, and two specimens of Hybrid *Coleus*, a leafy arborescent *Euphorbia*, and a remarkable example of *Aralia filicifolia* (?) from the same locality.

MONDAY, 25TH FEBRUARY, 1878.

W. J. STEPHENS, Esq., M.A., President, in the Chair.

DONATIONS.

The SECRETARY reported receipts from the Hamburg Society of Natural History of their "Verhandlungen des Vereins für Naturwissenschaftliche Unterhaltung in Hamburg, for 1871-74 and 1875."

PAPERS READ.

On a new genus of MILLEPORIDÆ.

By the Rev. J. E. TENISON-WOODS, F.G.S., F.L.S., Cor. Mem.
Lin. Soc., N.S.W., &c.

The family of *Milleporidæ* were formerly included by zoologists amongst the *Zoantharia* in an entirely different class from the

Acalephs, to which they are now referred. They are solid and stony corals, as much so in fact as any of the reef-building class. They generally have a smooth surface, and are always without any prominent calices, there being only very minute rounded punctures over the surface from which the animals show themselves. Some of the principal reefs on the Carribean Sea are mainly composed of Millepore corals. The cells in the zoothome are divided parallel to the surface by very thin plates or tables, as in the *Pocilliporæ* and *Favosites*, and they were formerly classed therefore with the other tabulate corals. The following was the arrangement proposed by Messrs. Edwards and Haime.

MADREPORARIA TABULATA.

Corallum essentially composed of a highly developed mural system, and having the visceral chambers divided into a series of stages by a complete diaphragm or transverse dissepiment. Septa rudimentary, either uniting or at most represented by processes extending more or less into the visceral chamber. There are four families in this section. A. *cœnenchyma* abundant. 1. Cellules or tubulæ foliaceous or massive *Milleporidæ*. 2. *Seriatoporida*: compact in arborescent tufts. B. Little or no *cœnenchyma*, the walls uniting with one another. 1. *Favositidæ*: walls lamellar. 2. *Thecidæ*: wall thick and compact.

1st Family MILLEPORIDÆ.

Corallum composed of an abundant tubular or cellular *cœnenchyma*, distinct from the walls of the corallites. Septa, few; desseppiments well developed and numerous.

M. Agasiz has proved that these animals are not corals, properly speaking, but an intermediate form of *Acalephs* between the embryo and adult state of *Medusæ*. The Millepores afford, therefore, examples of coral-making by species of the class *Acalephs*. The corals are solid and stony, with a smooth surface without any prominent calices, there being only very minute rounded punctures over the surface from which the animals show themselves. They have no resemblance to true

polyps. There is simply a fleshy tube with a mouth at the top, and a few small rounded prominences in place of tentacles, four of them sometimes the largest.

ARACHNOPORA. New Genus.

Zoothome parasitic spreading like a small thin web over other corals.

ARACHNOPORA ARGENTEA. n. s.

Zoothome spreading in a small extremely thin web, silvery white, and in parts quite transparent, which are sparsely covered with small silvery granules. The calices are all small very slightly raised, rounded, on which septa protrude as three or six broadly triangular teeth; calices irregular, but with a tendency to a quincuncial arrangement. Length of zoothome 7, breadth 3 mil. Calices like minute dots, barely discernable to the unassisted eye.

In this species the substance of the zoothome seems a quite transparent membrane, on which there is generally a very close arrangement of small silvery granules. It occurs parasitic on corals, filling up half of the calice and spreading from opposite septa just like a spider's web. It also spreads over the sides of the costæ, where it appears just like a snail's track on which some very fine white dust had been sparsely scattered. There are no calices on the outside.

ON A NEW SPECIES OF PSAMMOSEERIS.

By the Rev. J. E. TENISON-WOODS, F.G.S., F.L.S., Corr. Mem.
Linn. Soc. N. S. W.

Plate I.

In 1848, Messrs. M. Edwards and J. Haime published in the *Annales des Sciences Naturelles* a definition of a new genus named *Heterocyathus*, which was referred to the second section of the Turbinolian family of corals. The genus thus established was meant to include simple cylindrical corals with a broad attachment always to shells which the base often enclosed, with

conspicuous ribs, circular calice, an essential columella, exert thick granular septa, and lobed pali. There were only two species in this genus, and one dependant upon a single specimen. They were always fixed upon a trochoid shell, which the tissue of the coral almost completely closed round in the course of its growth, and the only sign of its presence was the circular aperture which was always left for the mollusc thus imprisoned. Subsequently Mons. M. Edwards discovered that one of the species, in spite of its pali and sub-entire septa which closely resembled the type of the genus in which it was placed, possessed synapticulæ, and should be separated, and placed in a distant family, the *Fungidae*. Here, however, it was also out of place, because no other genus of the family possesses pali. But the pali themselves are doubtful. They are lobed, and so are the septa, and indeed hardly distinguishable from them. In 1850 Mr. J. E. Gray added what he considered a third species to the genus. This was *Heterocyathus hemisphericus*, described in the *Annals of Nat. Hist* for 1850 (Second Series, Vol. 5, p. 410.) It was brought from the China Seas, and was thus described:—Corallum extremely short, four complete cycles; septa unequal, primaries very thick, especially near the columella, the next in extent are the fourth order, then the secondaries, then the fifth order, then the tertiaries, which are smaller than all the others, all very close, but little raised, and the border feebly arched. The two latter species have been erected into two genera. One *Psammoseris*, which is thus characterised: Corallum of trifling height, fixed on a shell which it completely encloses, except at the peristome; wall thick, bare, strongly granular, and scarcely striate beneath; columella papillary, septa scarcely prominent, thickly covered with very projecting granules, penultimate cycle more developed than the last, and approaching each other before the last. I confess that this description does not appear very clear. The words in French are as follows:—“*Celles (cloisons) de l'avant dernier cycle beaucoup plus développées que celles du dernier et rapprochées entre elles au-devant de ces dernières.*” It would seem as if the third cycle was larger than

the fourth, but this is exactly contrary to the description of the type species, Gray's *Heterocyathus hemisphericus*, of which it is especially stated that the tertiaries are the smallest. If the orders were meant the description would be still more obscure.

The species I have to bring before the notice of the Society appears to me to be one that should be referred to *Psammoseris*. It is, however, very peculiarly distinguished by having the union of the fourth and fifth orders in front of the third, and the thickened lobate mass thus resulting unites again on each side in front of the secondaries. It also has pseudo-pali in the lobes, which spring from the septa, but they are many in number, and in fact the septa alone would incline one to refer the species to the *Astrangiaceæ*. The union between the septa is effected by small processes like synapticulæ, but the granules themselves on the faces of the septa never seem to unite. The mode of junction and the inclination of the septa recalls *Eupsammidæ*, but the wall is quite imperforate. There does not appear to be any other resemblance except the junction of the septa. There is the greatest difference between the various specimens in the thickness and granulation of the septa. Some are so thick and close that the granules almost touch, making the calicular fossa seem like a regularly paved cavity; others are thin, wavy, and scarcely granular, having the rough fossa very conspicuously uneven from the lobes of the septa.

PSAMMOSERIS CYLICIODES. n. s.

Corallum in general fastened to the mouth of a turriculate shell (*Mitra amanda*, Reeve, *M. hebes* &c., an unknown *Terebra*, and some shells, which are quite covered except at the aperture), base wider than calice, and more or less constricted between, and all the exterior irregularly covered with fine granules; calice irregularly circular, fossa deep and wide; septa exsert, in six systems of four cycles; primaries with the two fourth orders and secondaries with the two fifth projecting above the edge in closely adpressed sets of three septa, the higher orders diverge from the first and second to meet before the third, and the

resulting tissue unites at once to the second, which forms thence a confused mass, sending up almost perpendicular lobes like pali, which are very granular; columella only a few inconspicuous papillæ at the base of the fossa; laminae of nearly equal thickness, the primaries being free throughout, and only slightly thicker; costæ conspicuous and distinct, corresponding to the septa, and about equal for the three first orders, the fourth and fifth being equal, small, and in some specimens only represented by a line of granules; intercostal spaces about equal, rather deep and smooth.

Alt. 5, diam. 7. Princess Charlotte's Bay.

There is a remarkable peculiarity in these corals, which is, that the granulations which cover the ribs sometimes extend a long way upon the spire of the shell on which they grow even far beyond other traces of the basal tissue.

EXPLANATION OF PLATE I.

- Fig. 1. Corallum attached to shell, magnified 2 diameters.
 „ 2. Corallum covering attached shell, magnified 2 diam.
 „ 3. Calice of fig. 1; 3 diam.
 „ 4. One system of costæ; 4 diam.
 „ 5. One system of septa; 4 diam.

EXHIBITS.

E. P. Ramsay, Esq., exhibited a very fine specimen of *Osteoglossum Leichardtii* (Barramundi), from the Dawson River, Queensland.

MONDAY, 25TH MARCH, 1878.

W. J. STEPHENS, Esq., M.A., President, in the Chair.

The Chairman introduced Captain Hutton, of the Otago Museum, New Zealand, to the meeting.

MEMBERS ELECTED.

E. Meyrick, Esq.; and C. Lentzner, Esq.

DONATIONS.

From the Hon. W. H. Suttor, Minister for Mines: Maps of the Hartley Coal Fields, prepared by C. S. Wilkinson, Esq., F.G.S.

From the Melbourne University, Calendar for 1877-78.

From the Societe Entomologique de Belgique, Compte Rendu, Part 45 of Serie II.

From Captain Hutton—Geology of Otago, by Hutton and Ulrich, and the following by the Donor:—Nest and Eggs of some New Zealand Birds; Structure of Leaf of *Phormium Tenax*; New Zealand Flax and its manufacture; Mechanical Principles involved in the flight of the Albatross; Sailing Flight of the Albatross—Reply to J. S. Webb; Modifications of the Capsules of Mosses; Moa Remains from the Knobby Ranges; Geographical Relations of New Zealand Fauna; New Zealand Sertularians; Relation between the Pareora and Ahuriri Formations; Contributions to the Ichthyology of New Zealand; New Zealand Delphinidæ; Cause of the former great extension of the Glacier in New Zealand; New Starfishes; Birds inhabiting the Southern Ocean; Zoology; New Genus of Rallidæ; New Tertiary Shells in the Otago Museum; Geological Structure of the Thames Gold Field; New Species of New Zealand Myriopoda; *Peripatus Novæ Zealandiæ*; Younger Formations of New Zealand; Date of the last Great Glacier Period in New Zealand.

PAPERS READ.

Description of a species of *MYIOLESTES*, from Fiji.

By E. P. RAMSAY, F.L.S.

MYIOLESTES NIGROGULARIS. *

Adult male. Crown of the head, mantle, and chest, ashy greyish-brown; back, wings, and all the upper surface of the

* Since the above has been in type I have ascertained that this *Myiolestes* has been previously described by Mr. E. L. Layard, under the name of *Lalage nigrogularis*. I am sure ornithologists will excuse me for not anticipating that Mr. Layard's "*Lalage*," of which I had not at that time seen a description, would prove to be a typical *Myiolestes*! I leave the description as it may be of use to ornithologists who may have been similarly misled; Mr. Layard's name of *nigrogularis* must, of course, stand.

body and tail, brown, of an olive brown on the outer webs of wings and tail, and slightly tinged with olive on the rump and upper tail-coverts; under surface of the wing and tail-quills brown, the shafts of the feathers white; the inner webs of the primaries and secondaries on the under side narrowly margined with pale reddish brown, lesser under wing-coverts and margins of the shoulder below black, axillaries whitish grey; ear-coverts slightly produced silky white; lores, sides of the face and the whole of the chin and throat extending to the chest and to behind the white ear-coverts, jet black; the black over the eye extends on the sides of the neck and sometimes across the nape, quite encircling the ashy grey of the crown of the head; chest, breast, and abdomen, ashy grey; flanks and under tail-coverts washed with olive or rufous brown; the tips of all the tail feathers slightly, and the two outer more distinctly tinged with fulvous; bill bluish horn color above and below, the inner margins white to the tip.

Immature males have the throat and sides of head and the chest ashy white, a black line behind the ear-coverts in some joins a black superciliary stripe extending from the black lores; the throat is mottled white and black. It is only in the fully adult (♂ ?) that the black extends across the nape.

Total length 8·3 in., wing 4 in., tail 3·5, tarsus 1·05, bill from forehead 1·2 in, from gape 1·3, height 0·4.

Measurements of immature species, all marked as males:—

	Inches.					
Total length	8·5	8·4	...	8·1
Wing	4	4	...	4
Tail	3·7	3·9	..	3·6
Tarsus	0·9	1	...	1
Bill from forehead	1·1	1·15	..	1·2
" " gape	1·2	1	...	1·25
" " nostril	0·7	0·7	...	0·8
" in height	0·4	0·4	...	0·4

I am by no means certain that the young of this species may not prove identical with Mr. E. L. Layard's *Myiolestes maxima*, but as

the only specimen obtained by Pearce was purchased from him without his knowledge while he was at Levuka, I have, consequently, no means of ascertaining whether they are distinct or not. The *young* of this species would answer well with Mr. Layard's description of *M. maxima* as far as it goes, but Mr. Layard distinctly states his specimen to be a male; now even the young males in *M. nigrogularis* show black on the throat, which is not mentioned in the description of *M. maxima*.

VITIA RUFICAPILLA, Ramsay.

In the same collection from which I obtained the above described *Myiolestes* I also found fine specimens of *Vitia ruficapilla*, which I observe has been inadvertently re-described by Dr. Finsch, under the name *Drymochaera badiceps*.

EXHIBITS.

Mr. Masters exhibited *albino* specimens of the Common Magpie, *Gymnorhina tibicen*, *Tropidorhynchus buceroides*, *Olimacteris scandens*, and *Grallina picata*, all differing very remarkably in plumage from the typical forms.

MONDAY, APRIL 29TH, 1878.

W. J. STEPHENS ESQ., M.A., President, in the Chair.

DONATIONS.

From La Societe Entomologique de Belgique: Compte Rendu Serie II, Nos. 46 and 47; also, The Annals of the Society for 1877.

From Baron F. Von Mueller: Vol. X. Fragmenta Phytographia Australiæ.

From the Royal Society, Edinburgh: Proceedings 1875-76 and 1876-77.

From La Societ  Hollandaise des Sciences   Haarlem: Archives N erlandaises des Sciences Exactes et Naturelles.

From the Auckland Institute, New Zealand: Report for 1877.

From the Rev. J. E. Tenison-Woods, F.G.S., etc.: On some Australian Tertiary Corals; Paleontological evidence of Australian Tertiary Formation; Tertiary Deposits of Australia; Some new Australian Polyzoa; Census—with brief descriptions of Marine Shells, etc.

From J. Brazier, Esq.: List of Land Shells—Fitzroy Island.

From J. W. Taylor, Esq. (the Editor), per Mr. J. Brazier: English Quarterly Journal of Conchology.

PAPERS READ.

Note on a species of *Therapon* found in a dam near Warialda.

By WILLIAM MACLEAY, F.L.S.

A few days ago I received from W. R. Campbell, Esq., of Trigamon Station, near Warialda, three specimens of a Percoid Fish of the genus *Therapon*.

Mr. Campbell states that they were taken from a dam a long way back from the river, quite unconnected with any watercourse, and which had been dry a few months back, and he asks very naturally how did they get there. Instances of a similar kind are not uncommon. I recollect many years ago when the Merool Creek was first occupied by Squatters, that fishes of considerable size were found in newly formed dams and in ponds which had been dry for years previously. These reservoirs were, however, all in old watercourses, which had been at a former period well supplied with fish, as the remains of Aboriginal ovens testified, and it was thought probable that the fish so suddenly appearing in these newly formed and filled reservoirs, might have been preserved alive in the moist sand of the bed of the Creek. This supposition might no doubt be correct as far as Merool Creek is concerned, but it certainly cannot account for the fish found in the Warialda Dam, for it is not near a watercourse, and moreover the fish found in it are not of a kind capable of living in moist sand.

I see no difficulty myself in the far more likely hypothesis that the Ova of the fish are conveyed from one place to another by adhering to the feathers of ducks or other aquatic birds. The

spawn of some fish float on the surface of the water, and the viscous matter in which the ova are enveloped would in that case inevitably cause some of them to adhere to the feathers of a bird swimming on the surface. I have observed too that after a heavy fall of rain following a dry season, wild ducks of all kinds will in one night entirely desert the rivers and lagoons to which they have been for months confined, and seek "fresh fields and pastures new" in the newly filled ponds, dams, and lakes of the back country. It is a matter of almost certainty then, that, if it be the spawning season of any species of fish whose spawn floats on the surface of the water, ducks or other waterfowl will carry the ova with them, and if the distance be not too great the transfer will take place without desiccation or destruction of vitality.

The three specimens sent me by Mr. Campbell are evidently young fish (about 4 inches long), and are I have no doubt of the same species as is found in the waters of the Gwydir, and of several others of the northern rivers of New South Wales, and of southern Queensland—*Therapon unicolor* Gunther, Catalogue of Fishes, Brit. Mus., Vol I., page 277.

The Rev. J. E. Tenison-Woods observed that the sudden appearance of fish in surface water derived from rain was a matter well worth the attention of naturalists. In the south eastern district of S. Australia there is a small fish named *lap-lap* by the natives, which does not appear to have been described. It abounds in the swamps of that extensive district, where there are no watercourses properly speaking, but where the swamps drain from one to another in very wet seasons as the country is a dead level and in no place more than 300 feet above the sea. In this district there are extensive tracts of desert, with here and there grassy patches and swamps of water to which the sheep are taken to depasture in the winter. In summer these swamps are dried and the sheep are withdrawn to the home stations often 20 to 40 miles away. He remembered in 1861 having crossed one of the desert places with a companion at the close of summer. They had ventured to make a short cut overland by the aid of some very heavy rains which had fallen during the same week. In crossing by an

abandoned hut where there was an extensive system of troughs by the side of a swamp, they found the troughs one-third full and literally swarming with *lap-lap* fish about an inch or an inch and a half in length. The troughs had not probably been used for two or three months previously, and they could hardly doubt that they had been filled by the rain for there were no traces of any sheep having been there recently or of any visitors at all. He supposed that the ova of this fish would bear desiccation without perishing and that they had remained in the troughs until hatched by the rain. He had often observed also that when the immense flats of the Mosquito Plains, and the Muddy Creek heaths were inundated in winter, that dray tracks or any little indentation of the surface would become a channel along which the water slowly ran. These were always stocked with *lap-lap*, though in this case of course the ova or fry may have come from the swamps. He had come to the conclusion that the ova of these fishes would bear desiccation without perishing, and that they were often blown about and carried considerable distances by the wind, in dust storms, &c.

On a new species of *DESMOPHYLLUM* (*D. quinarium*) and
a young stage of *CYCLOSERIS SINENSIS*.

By REV. J. E. TENISON-WOODS, F.L.S., F.G.S., Cor. Memb.
Linn. Soc.

Desmophyllum is a genus of Turbinolinæ, which is specially distinguished by the presence of an epitheca and the absence of a columella; the corallum is simple, generally fixed by a large base; the fossette is very deep, and the septa are very much exerted, and stretch out like huge wings; the last cycle is more developed than that which precedes, and are often united to their neighbours, of the higher orders, from which they slightly diverge as they approach the centre; the wall is bare, smooth below, and presents some little crests in the neighbourhood of the calice. The genus was originally established by Ehrenberg for a species

of *Madrepora* of Esper. There are six species enumerated by Messrs. Ed. and Haime, viz., *D. cristagalli*, Ebenb., *D. Cumingi*, E. and H., *D. costatum*, *D. dianthus*, Esper., *D. ? Stokesii*, E. and H., and *D. taurinense*, Michelin. The latter is fossil. Prof. Duncan has reduced the four first to mere varieties of one species, for which he retains the name of *D. cristagalli*, though it seems as if Esper's name (*D. dianthus*) should be the one selected, as it has long priority (1797). The same author regards *D. Stokesii* as an immature form of the other varieties. He says (*Madreporaria of the deep sea*; *Trans. Zool. Soc. vol. 8, 1873, p. 321*). "If the variations of the typical form of this species are studied, it will be noticed that there are great difference in the position, size, and continuance of the costæ, in the exsertness and granulation of the septa, in the height, compressedness, and size of the base of the corallum, and in the granular ornamentation of the outside of the wall in different specimens. The size, costal developement and granular condition of the ornamentation of the septa, and outside of the corallum, depend upon the age and nutrition of the specimen. Very thin septa are not so granular superiorly as those of corals, which have very thick walls, and dense septa, and the costæ of the latter kind are usually most prominent. At great depths, and where the *Madreporaria* appear to be very abundant, the specimens of *Desmophyllum* are usually very granular externally, moreover they become attached to compound forms of corals, and both have the same ornamentation, so that it is difficult not to believe in the *Desmophyllum* being part and parcel of the growing mass. One specimen is attached partly to broken specimens of dwarfed variety, with a small calice, and without costæ. Other forms are finely pedunculate" (*loc. cit.*).

I bring this character of variability prominently forward, so that it may be seen what claims the present species has to be regarded as distinct.

DESMOPHYLLUM QUINARIUM, n.s.

Corallum much depressed, narrowed very slightly at the base, and twisted; epitheca, coarse and irregular, with the costæ

appearing like somewhat sharp keels or ridges; but in the only specimen seen by me, the base is so incrustated with calcareous algæ in thin lamellæ, that very little can be seen below the edge of the calicular margin; calice, subpentagonal, but irregular; septa, very high and falcate, concentrically undulately striate, in five systems of three cycles, with the rudiments of a fourth; secondaries, thin in long arched lobes, which very much overhang the edge of the calice; primaries, tall and straight, not exsert, but reaching more towards the centre of the fossa than any others; tertiaries, small, thin, nearly as much exsert as the secondaries, and inclined or curved towards each other outside the wall; fourth order present in two systems only as thin short exsert lamellæ; tubercles representing a fifth order in one system; fossa deep and narrow; wall thick and indented inwards by the side of the primaries. Alt. 10, width from the extreme ends of the secondary septal lobes 15 mill. Fiji 20 fathoms, from a bay near Levuka, Dr. Rayner. In the Macleayan Museum.

From the incomplete character of the septa, on which few or no granules are visible, it is evident that this is only a young specimen. There is, however, nothing in the coral to give rise to the suspicion that the quinary arrangement is due to abortion. The form is peculiar and exceedingly interesting, and no doubt when other specimens are found, the characters of the adult will modify some of the characters which are now described.

Family FUNGIDÆ, Sub. Fam. LOPHOSERINÆ. Genus CYCLOSERIS.

This genus, which in addition to living species, extends as far as the cretaceous rocks as a fossil, is represented at present by *C. cyclolites*, and *C. hexagonalis*, and *C. sinensis* on the Barrier reef of north eastern Australia. Only the first has hitherto been regarded as Australian. They are small corals, like mushrooms, distinguished from *Fungia* by the wall being neither perforate nor hispid. In *Cycloseris* there is no epitheca. In *C. cyclolites* the disk is very high in proportion to its diameter; in *C. hexagonalis* it is extremely thin, larger than the last, and hexagonal in the young stage. *C. sinensis* is three times as thick as the last, though nearly as large. I doubt very much whether the two species can be separated. They have both from 7 to 8

cycles, and are common on the coral rocks, and in sandy places at from 10 to 20 fathoms. So little is known of the young stages of any of these corals that I think it worth the notice of naturalists to describe a young *O. sinensis*.

Corallum very small, quite circular, somewhat raised or thick, base not quite flat but sloping very slightly to a circular flattened disk, about half the diameter of the whole; costæ very distinct, prominent, in cycles corresponding to the septa, and agreeing in point of size, all very granular, and becoming a mere set of detached granules in the central disk; septa rather thick, projecting beyond the margin, increasing in height to the edge of the fossa, all closely and very prominently granular, and the edges dentate in six systems of five cycles; primaries free to the fossa, and much thicker than the others; tertiaries united to the secondaries at the fossa; fourth and fifth order uniting with the tertiaries about half way; all the orders of the fifth cycle present, but the two last much smaller, and all much serrated at the edge; fossa small, columella represented by a few papillæ. Diam. 6, alt. 2 mil. Princess Charlotte's Bay, 10 to 20 fathoms Chevert Expedition.

The flattened disk at the base of the corallum would seem almost like a point of attachment. If the young stage of *O. sinensis* is pedicellate, it hardly leaves any traces of its existence in the adult state. The specimens under notice were found free, so that the fixed state must belong to a still earlier stage.

Oycloseris sinensis is said by Messrs. Ed. and H. to be a native of the Chinese seas, and there is no mention made of any central disk, which however is found on the lower part of every Australian specimen. I have not been able to compare with any type specimen, so that our Australian examples may after all be a different species. But the similarity is so close in every other respect that I can hardly think this is the case.

EXHIBITS.

The Rev. J. E. Tenison-Woods, F.L.S., etc., exhibited seeds of various kinds of *Eucalyptus*, and directed attention to the fact

that Eucalyptus seed had frequently been sold under fictitious names, the seeds of common and inferior kinds having been substituted for the more valuable descriptions.

Mr. Brazier exhibited a collection of sternums of Fowls displaying the effect of different kinds of perches in modifying the shape and curvature of the ridge. Mr. Brazier showed that where the fowls roosted on a round perch the breast bone was normal; but those that roosted on flat battens had the breast bone distorted.

Mr. Masters exhibited a *Majaqueus Parkinsoni* or New Zealand Petrel shot near Sydney Heads, and remarked that it was the first recorded instance of this bird visiting the Australian Coast.

MONDAY, MAY 27TH, 1878.

W. J. STEPHENS, Esq., President, in the Chair.

MEMBERS ELECTED.

CHARLES JENKINS, Esq., L.S., Yass, and T. TENISON-WOODS, Esq., Sydney.

DONATIONS.

From La Société Entomologique de Belgique: Compte Rendu, Series II., No. 49.

PAPERS READ.

ON THE GEOLOGY OF YASS PLAINS.

By CHARLES JENKINS, Esq., L.S., Yass.

Plate VI.

In offering an account of some years' labor in the fossiliferous strata around Yass, I must apologize for not giving at present all the detail that may be desired. I find it impossible to accompany this paper with the necessary plans and sections, the result of surveys I have made, without which minute description would be unsatisfactory. I hope, however, in a future paper to supply the information I am now compelled to omit, accompanied by drawings of as many of the principal fossils as possible.

It is chiefly of the beds exposed for three or four miles along the course of the Yass river after it reaches the town of Yass that I shall at present treat.

The Yass river enters the town of Yass on the east, then makes generally a westerly direction flowing alike over hard and soft rock, porphyry and shale, just as the dislocation of the strata had marked out for it a course, which it has deepened and widened as best it could.

Very interesting are the cliffs on each side. Now we have two hills of porphyry of very different composition, facing each other—the junction of the two porphyries being the bed of the river—then seventy feet of shale and limestone, every vertical foot of which will yield a rich harvest to the geologist. A little further and we have the section of a hill in which the strata broken off on each side are bent in towards the centre, making there almost as acute an angle as the letter V. Again, a little further, and the strata are reversed, vertical, then contorted in the most varied curves, and the former impure limestone changed into marble, marked with pink and other colored stains in patterns of the sections of the shells and corals it formerly contained.

The main course of the valleys on either side show a somewhat different origin to that of the river. They are formed chiefly by the scooping out of the softer strata, leaving ridges on each side capped by the more indestructible rock. As the direction of the dip of the strata is from 20° to 40° south of west, these ridges that flank the valleys present to view in many places as you turn east steep encarpments, and gentle slopes as you look west. They bend round the igneous rock to the west of Yass, forming part of a great curve, not, however, by an uniform sweep, but by jumps, wrenched aside with a sudden twist and interrupted by faults. These faults and twists have given rise to smaller valleys and water-courses, which, in general, mark the limit of the broken and intruded strata.

Wonderful things are those hard rocks that cap the Humewood and Belle Vale ridges. In one place we have an ancient Coral Reef, rich in the most varied Palaeozoic forms,

and differing, I imagine, from the Coral Reefs now forming, only as Palæozoic differs from recent Coral. A little further, and if you are fortunate in cleaving the stone you will have a surface presenting a strange confusion, on which it will be difficult to find a spot not occupied by one of the fossil forms of the varied life of the old seas. Another will yield hardly anything but Trilobites, jammed together heads and tails so thickly as to render it difficult to procure a perfect specimen.

I will now go back to our former starting point, and take the Yass beds in the order of their deposition. Standing at the edge of the igneous rock (a kind of syenetic porphyry) where the river enters the town on the east side, and turning westward, you will look straight across the fossiliferous strata, which here, with intervening Porphyry and altered rock, have a breadth of from four to six miles. The view across the strata is interrupted by the range west of the town. The mass of this range is Porphyry. This Porphyry naturally divides the sedimentary rocks into two parts—that portion to the east of the Porphyry bending in one direction to the south-east over the Yass Plains, and in the other marked by the course of part of the Bango and Fairy-hole Creeks, I propose to call the *Yass Beds*. That portion to the west of the Porphyry, and bending to the south-east over the Yass Plains, and in the opposite direction, west of north, along a course marked by part of the Derringullen and Limestone creeks, to about a mile above the junction of these two creeks, I propose to call the *Hume Beds*—these beds being so largely developed on the property that belonged to the late Hamilton Hume, Esq., our great explorer.

Starting then on the edge of the Yass Beds, following the river, we have first a few feet of altered strata, a thin layer of limestone, then two feet of fossil bearing strata. Of species obtained hence there are four Brachiopods, including a small *Langula* and an *Atrypa*; three Gasteropods, including one very like *Bellerophon acutus*; an impression of a rather large *Orthoceras*, and a number of very small things not made out.

Then follows some black, slaty-looking shale, cleaving readily in the direction of the bed. These beds gradually become more

micaceous and gritty, with an occasional thin band of limestone until they pass into hard compact grit, at a thickness of about 500 feet from the Porphyry. The upper and lower beds of grit are separated by strata of greenish shale; the lower grit is in some parts thin, flaggy, and easily disintegrated, in others compact and rudely jointed.

The lower portion of the grit is in some places full of cubical crystals of oxide of iron. Some of the upper grit has been quarried for building. It exhibits, in many places, distinct ripple marks. The top course is, however, very hard, siliceous, coarse-grained, and sometimes almost conglomerate, with signs of altered condition. I have obtained no fossils from the grit.

The top of this upper bed affords a convenient means of dividing the Yass Beds into two parts, giving to the lower portions a thickness of about 700 feet.

The next division, the especially fossil bearing half, is best studied by starting from the rock just described at a point where it crosses the river, about a quarter of a mile further down. The strata, after some thin, not very coherent, gritty beds, gradually become calcareous, until they pass into a compact flaggy limestone, just above the *Spirifer* Beds. The fossils found lowest in this division were a *Lingula* and a *Trochus*, succeeded occasionally by an *Orthonotus*, and some ribbed *Spirifers*, until at a thickness of about 135 feet we have a small band of black impure limestone, nine inches thick, loaded with fossils.

This band at first contains chiefly several species of *Murchisonia* and some of *Loxonema*, succeeded by a layer of *Spirifers*, and these by a thin mass of *Pterinea* and *Modiolopsis*. Among the *Spirifers* we find here, however, there is no *Spirifer Yassensis*. That *Spirifer* cannot be obtained nearer than the Devonian of the Murrumbidgee, in which strata, at a distance of about twelve miles from Yass, it abounds. A *Retsia*, *Orthis*, and *Orthoceras*, were also found here.

I will now pass over some flaggy limestone; two beds, from 3 to 4 feet thick, of compact sub-crystalline limestone, the latter though full of fossils, yielding little; and some Calcareous gritty beds, to an impure limestone, from which many species have been obtained.

The chief fossils obtained from this rock were several species of *Spirifer* and *Atrypa*, including *Atrypa reticularis*, and *A. aspera*—a *Strophomena* (dorsal valve convex), a *Bellerophon*, *Eunema*, *Ecculionophulus*, *Maclurea*, and a large *Helix*-like *Trochus*. Among the Conchifers, a large *Arca*-like species is the most conspicuous. Of Trilobites; *Phacops*, and *Cromus*. This limestone, at Mylora, is overlayed by a flaggy unfossiliferous limestone. The whole thickness of the Yass Beds, near Yass, is about 1,000 feet. Dip from 30° to 40° lower division. Dip from 18° to 40° upper division.

We will now stop in our progress across the strata, and turn aside a little to the south. Near one of the lower limestone courses, beyond the town, I have obtained some very small fossils that help to connect together the different parts of the Yass Beds, and the Yass with the Hume Beds. A head of a small sized *Bronteus* was found here. Peculiar to this spot is a small, spherical, tuberculated *Glabella*, having a very Devonian aspect.

HUME BEDS.

Crossing now the Porphyry, separating the Yass and Hume Beds, and starting from where the latter cross the Yass River, and following the westward course of the river to a steep cliff, then continuing in nearly the same direction across the beds, we shall take the strata as before in the order in which they were laid down.

These beds are naturally divided into four parts, which division will answer our present purpose well enough. The first, from the Porphyry to the river at the base of the cliff, near the junction of Boonu Ponds with the Yass River; the second, from the river to the top of the Coral Reef; the third, from the Coral Reef to the Trilobite Limestone; in the fourth, I have not as yet found any fossils. We have first some laminated Porphyry, in which are various fossils, among others encrinital stems of a Lower Silurian type; then a limestone, more developed and richer in fossils, at the Derringullen and Limestone Creeks; then a mass of sub-crystalline altered rock, traversed in one place by igneous

rock; then a limestone, composed of thin courses of hard sub-crystalline nodules, weathering yellow, set in a blackish, less pure limestone; then alternations of shale and limestone to the river. From this portion I have obtained the following fossils:—Trilobites; *Cheirurus* (Pl. VI, figs. 5, 6 and 7); *Calymene* (Pl. VI, fig. 4); *Sphærezochus* (Pl. VI, fig. 2); *Homalonotus*, *Acidaspis*, *Cromus*, and *Encrinurus*. Brachiopods; *Pentamerus*, including (especially to be remarked) *P. oblongus*, (Pl. VI, fig. 3), *Atrypa*, *Rhynchonella*, *Spirifera*, *Orthis*, *Lingula*, and *Discina*. Gasteropods; *Murchisonia*, *Euomphalus*, and *Bellerophon*. Conchifers; *Orthonotus*, *Modiolopsis*, and *Pterinea*.

The *Pentamerus oblongus* is confined to about the lower two thirds of this division. *Cheirurus* becomes rare in the upper part; *Calceola* is found all through. Especially remarkable is it that near the top of this division are two bands of limestone of from six to nine inches thick, containing fucoids. Crossing the river at the bottom of a steep cliff, we have thin courses of nodules and flags of limestone, often concretionary, alternating with shale, which frequently shews the same concretionary structure, gradually becoming more calcareous until it passes into an absolute Coral Reef.

The shale of this division is the richest of any in variety of species. The lower part especially abounds in *Pentameri*; *Atrypa* is scarcely less abundant; *Atrypa desquamata* especially plentiful. *Spirifera* and *Calceola* are equally characteristic of this zone. Some of the *Spirifers* have a very sub-carboniferous look and are like *Spirifer glaber*. *Orthis elegantula*, and *canaliculata*, and a large *Strophomena* are only found here. The *Strophomena*, like most of those in the Yass Beds, has the Dorsal valve convex in the manner of *Strophomena euglypha*. Cup corals are everywhere here. Of the wonders of the Coral Reef at the top of this cliff, what shall I say? I have not yet made out one tenth of the species. Among others there are, however, *Favosites Gothlandica*, *F. aspera*, and *Heliolites Interstinctus*; all Silurian species.

The next division is characterised especially by the Trilobites of the genera *Bronteus*, *Calymene*, and *Sphærezochus*, together

with a large Trilobite closely allied if not identical with *Phacops longi caudatus* which occurs in the top beds. One *Calymene* is undoubtedly *Calymene duplicata*. The *Sphærezochus* is almost identical with *Sphærezochus mirus* as figured by Murchison.

Size of largest *Calymene* $2\frac{1}{4}$ inches in length.

Size of largest *Sphærezochus* 2 inches in length.

The Trilobite in the upper bed (Pl. VI, fig. 1), which is an impure limestone, is chiefly associated with a *Petraia*. Some parts of this limestone literally swarm with segments of this Trilobite. I have, however, obtained one cast, rather mutilated, of the whole body, and another whole Trilobite doubled up. The head segment of this Trilobite is very like that of *Dalmania pleuroptyx* as figured by Dana, both in its general proportions and the direction of the facial suture; the furrows on the Glabella are straighter in Dana's figure than on any specimen I have. *D. pleuroptyx* is a Silurian species, though, like *Phacops*, *Dalmania* is both a Devonian and Silurian genus.

These Trilobites attained a size of 5 inches in length exclusive of the spinose caudal appendage.

As I have obtained no fossils in the next division and as after attaining a thickness altogether of 2,000 feet these beds by folds and faults repeat themselves until they reach the Igneous Rocks, I shall not at present trace them farther.

In comparing the results obtained from the Yass and Hume beds, I think that there is sufficient evidence in the similarity of the fossils to shew that they must both be classed in one formation.

I cannot speak of the exact number common to both, but there are certainly among the Brachiopods—two species of *Atrypa*, including *Atrypa reticularis*—several of the genus *Spirifera*, including two plaited Spirifers, two of *Strophomena*, and one of *Rensselaeria*. Of Couchifers I believe several, including an *Orthonotus* and a *Pterinea*; a *Murchisonia* among the Gasteropods; of the Trilobites *Bronteus* and *Oromus*. There is no doubt about the *Oromus*; the *Bronteus* is, however, in the Yass beds so small, and the markings so indistinct, that it is not possible to speak with certainty, but what can be seen makes it probable that it is identical with that found in the Hume beds.

In contrasting these beds lithologically, the large proportion of grit dividing the Yass beds into such unequal halves, and the absence of those large limestone masses which form so prominent a feature in the Hume beds, are the first things to attract attention. Then we have in the Hume beds an almost entire absence of that somewhat symmetrically transverse jointed structure exhibited in most of the Yass grit and limestone, and instead, a preponderance of concretionary structure in limestone and shale.

Then as to the fossils—the absence in the Yass beds of large corals generally, and especially of those masses which are so remarkable in the Hume beds is also to be observed. The fossils of the Hume beds are further distinguished by the number of individuals, large size and variety of species and genera of Trilobites, the number and variety of *Pentameri*, and by the presence especially of *Pentamerus oblongus*; by the number and variety of the genus *Orthis*, and by two layers of limestone containing *Fucoids*; also by their being distributed with an approach to uniformity through a great thickness of strata, whereas in the Yass beds all the fossils are collected in bands which, if taken altogether, would not be more than from 10 to 20 feet thick.

The character imparted to fossils of the Yass beds is due to the great number and variety of plaited Spirifers, and the number of *Murchisonia*, *Bellerophon* and *Pterinea*. Peculiar to these beds is also a *Maclurea*, a large Helix-like *Trochus*, an *Eccoliomphalus*, and a small Trilobite, with a nearly globular glabella covered with tubercles.

These differences of the fossils of the two series of beds cannot however, as I think, be considered as altogether marking the characteristics of the different geological periods. The local conditions under which these deposits have been formed have undoubtedly done much to produce the results we now see. When the Yass beds were being laid down, there must have been at least four principal changes of level, two of elevation and two of depression, as evidenced by the double series of bands of grit beds, separated by intervening shale. The waters were tolerably troubled too during the deposition of some of these beds, for some

of the upper limestone is full of lumps of shale. These considerations may account for the absence of the larger corals, and together with the fact that many recent species of *Trochus*, *Avicula* and *Cephalopoda* are found between low water and 50 fathoms may explain why the first remains of the fauna of the seas that succeeded the sinking of the old shore—now represented by the grit with its ripple marks—should be such a group as we there find of *Modiolopsis*, *Avicula*, *Murchisonia*, and *Orthoceras*. That the sinking was interrupted by periods of upheaval, seems probable from the thin layer of sandstone covered with *Aviculidæ* that occurs above the strata of Spirifers and *Pterinea*. This thin layer seems to explain a rather notable thing connected with this Spirifer bed. Evidently, to my mind, these Spirifers were not buried in the order their fossil shells now lie. From a foot below the Spirifers to this sandstone layer everything appears sorted. First we have a layer of irregular lumps, then one of smaller lumps, often containing a *Murchisonia*, a *Loxonema*, and an occasional Spirifer; then a layer of almost nothing but Spirifers as close together as possible, but scarcely an inch thick; then *Pterinea* two or three deep, but not making a thickness of half an inch; then smaller *Aviculidæ* and sandstone. Does it not seem probable that the temporary rising of the sea bed brought the burial place of these mollusca within the action of the tide, whose ebbing and flowing has sorted them in a manner that no other agent but running water, as far as I know, ever does.

NOW AS TO THE AGE.

It cannot be expected to establish in Australian geology the minute subdivisions it has been found necessary to make in the geology of other distant countries; very unlikely, for instance, that the same breaks should occur here as in England and America. The division of upper and lower Silurian not arising from local arrangements has been made out in all countries where the Silurian system is at all developed. I therefore consider the terms upper and lower Silurian can be used here. The Yass Period, or the period of the deposition of the Yass and Hume

beds, I believe to be essentially upper Silurian, and one portion at least to represent the equivalent to the lower part of the upper Silurian of other countries.

No fish bones have yet been discovered, so that at present the Yass Period satisfies the requirements of the Silurian formula: a *Fauna* represented by invertebrates, of which the *Articulata* are chiefly Trilobites; and a *Flora* by *Fucoids*. To the Trilobites, however, we must look for the most decisive testimony. The fact of *Oalymene* ranging all through the fossiliferous portion of the Hume beds, and *Oheirurus* and *Spherezochus* ranging nearly through—these being exclusively Silurian genera, is almost sufficient evidence in itself from which to class these beds as not newer than the upper Silurian; while the absence of any Trilobites of exclusively lower Silurian genera affords a presumption that they are not older, which presumption is strengthened by the presence of *O. reticularis* and *Pentameri*. The presence of the large Trilobite closely allied, if not identical with *Phacops caudatus* and having no resemblance to the Devonian species of *Phacops*—and of the *Homalonotus* which is not of the characteristic Devonian type, all add force to the evidence afforded by the frequent occurrence of the other Trilobites. The only part of a Trilobite with a Devonian aspect I have found in the Yass beds is the Globular Glabella. The variety of *Orthidæ*, of Silurian species, as *Orthis elegantula*, helps to stamp these beds Silurian. While the abundance of *Pentameri*, especially the presence of *Pentamerus oblongus*, support the inference that part of these beds may rightly be considered to represent the lower part of the upper Silurian. The presence of a *Maclurea* must not be forgotten.

Pentamerus oblongus is especially relied upon by Sir Roderick Murchison as determining the strata in which it occurs, in Europe and America, to be the equivalent of the *Llandovery* of the British Siluria. The *Oheirurus* found in these beds is *Oheirurus insignis*, a *Llandovery* species. (*Recherches, sur les fossiles, Paleozoïques de la Nouvelle Galle De Sud, par L. C. De Koninck*). †

† The following is a list of fossils, which, in Professor Koninck's work already quoted, are classed as Devonian, and said to be found in the

Among the corals we have unquestionable Silurian species, *Favosites Gothlandica*, *F. asper*, *Heliolites interstinctus*.

The occurrence of hollow encrinital stems, a lower Silurian type, gives additional weight to evidence in favour of one portion at least being the equivalent of the lower portion of the upper Silurian.

The presence of *Calceola* and *Atrypa desquamata* cannot be considered to outweigh the evidence drawn from the mass of Silurian species among which they are found. Their presence there is not so remarkable as was the finding, in Bohemia, in the midst of Silurian species, of large-sized *Goniatites*, supposed before to be no older than Devonian.

To these reasons I will add, that in the limestone of the Murrumbidgee, which in places is crowded with many plaited broad winged Spirifers, I have found *Spirifer Yassensis*, *Leptæna subæquicostata*, *Lozonema anglicum*, *Niso Darwinii*, species determined by Professor Koninck from specimens forwarded to him by the Rev. W. B. Clarke, to be established Devonian fossils; but I have not found a sign of a trilobite nor one shell common to both the Murrumbidgee limestone, and to the Yass and Hume beds. I will not conclude without some reference to the igneous rocks. They are all chiefly Porphyry, some very like Syenite, and presenting on the hill tops a very granitic arrangement of boulders. Other varieties are numerous, some with a pink felspathic base, and several with rather large crystals of felspar

neighbourhood of Yass, but which are certainly not to be found in the Yass or Hume beds. They will all, I have no doubt, be found where I found those marked with an asterisk (*), that is on the Murrumbidgee, in beds overlying unconformably the Yass and Hume series.

Dicæna Alleghania
Chonetes Hardrensis
Leptæna nobilis
Rhynchonella Pleurodon
Spirifer multiplicatus
Spirifer Cabedensis
Spirifer Lalisinuatæ
Mitchella Striatula
Nutica Cirriformis
Cystoceras Woodii

Orthoceras subdiminuatæ
Murchisonia Turris
Murchisonia Vernuliana
Murchisonia Granifera
Bellerophon convolutus
Pleurotomaria Subconica
 * *Leptæna Subæquicostata*
 * *Spirifer Yassensis*
 * *Lozonema anglicum*
 * *Niso Darwinii*.

and Hornblende, and probably Pyroxene. That some of these rocks are newer than the sedimentary beds is evident by the altered conditions of some of the strata in contact with them.

Some may be of the same age, for in several places we have the Porphyry enveloping fossils, while in others it is studded with casts, which it has beautifully preserved, while it has destroyed the shells.

Of metals I will merely mention the fact that Galena has been obtained in the Hume beds at Limestone Creek, near its junction with the Derringgullen, and near the Derringgullen Creek, about three miles from its junction with the Yass River.

In comparing the fossils of these beds with those of the upper Silurian of other countries, the absence of Graptolites is a marked peculiarity. There are, however, abundance of Bryozoan and probably Sertularian forms. It will also be noticed that there are wanting those large forms of Cephalopoda which are usually found in some of the beds of that age.

This last fact seems of itself to point out how small a portion the Yass Period represents of the Silurian of New South Wales, and how impossible it would be to attempt to fix the exact position of these beds in the Silurian series, until other beds of the like age have been examined as carefully as these have been.

EXPLANATION OF PLATE VI.

- No. 1.—*Phacops* from the Limestone (Belle Vale Limestone),
upper bed of 3 division Hume bed.
 „ 2.—*Sprenochus* from the Hume beds.
 „ 3.—*Pentamerus oblongus*. Hume beds, lower portion.
 „ 4.—*Calymene Duplicata*. Hume beds. (Lower Silurian,
Europe).
 „ 5 to 6.—*Cheirurus*. Hume Beds.
 „ 7.—*Cheirurus Insignis*. Hume Beds.
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Descriptions of some new Fishes from Port Jackson and King
George's Sound.

By WILLIAM MACLEAY, Esq., F.L.S.

Plates II, III, IV, V.

FAMILY PERCIDÆ.

1.—*SERRANUS GUTTULATUS*. Pl. II.

D. 11/15, A. $\frac{3}{8}$, L. lat. 96.

Body compressed; the height one-third of the total length, the length of the head the same, profile slightly concave; eyes, one and a half diameter apart, the same distance from the snout, and seven times in the length of the head; maxillary bone reaching to the vertical from the posterior margin of the eye; præoperculum serrated on the posterior edge, and produced and strongly toothed at the angle; opercular spines flat, the upper longest; the third, fourth, fifth, and sixth dorsal spines longest, the third anal spine longest, the second thickest.

The general colour is a pale yellow, with numerous small pale red spots; these spots are distinct on the head, but on the body they are so thickly placed as to give the appearance of continuous lines; there are some whitish bars about the mouth and chin; the caudal fin is rounded and of a yellowish black hue, as are also the ventrals; the spinous dorsal is blackish; the soft dorsal and anal fins are also dark coloured with a broad yellow edge; the pectorals are yellow, and reach almost to the anus.

Length 14 inches.

A specimen of this handsome fish, the first I have seen, was taken by the hook in Port Jackson, a few days ago. It seems to have some resemblance in colouring to *Serranus Awoara* of Temm. and Schleg., a Japanese fish; but the formula of fins is very different.

2.—*CHÆTODON OCKLLIPINNIS*. Pl. III, fig. 1.

D. 10/23, A. 3/19, L. lat. 50.

Height of body one-half the total length; snout shorter than the diameter of the orbit; mouth small; præoperculum strongly serrated; the fourth, fifth, and sixth dorsal spines longest, and

nearly as long as the head ; soft dorsal and anal fins rounded behind ; tail long and forked. Colour pale brown with six black vertical bands, the first through the eye, the second behind the operculum to the ventral fin, the third from the spinous dorsal to the vent, the fourth from the beginning of the soft dorsal to the anal, the fifth near the tail, and the sixth on the tail ; under and a little in advance of the pectoral fin there is a large whitish patch ; and on the soft dorsal and anal a large black whiteedged ocellus, that on the dorsal extending from the third to the eighth ray, and on the anal from the second to the fifth. Length of specimen 3 inches, 4 lines.

From King George's Sound.

FAMILY TRACHINIDÆ.

ISOSILLAGO. N. GEN.

Body elongate, rather compressed ; cleft of mouth small ; eye lateral ; scales very small ; spinous dorsal with 13 spines, continuous with soft dorsal ; ventrals thoracic ; lower pectoral rays branched ; teeth on the vomer and palatine bones ; præoperculum denticulated ; bones of the head with the muciferous system well developed ; 7 branchiostegals, Pseudobranchiæ.

This genus differs from *Sillago* in the continuous dorsal fin, smaller scales, and in having 7 branchiostegals.

3.—ISOSILLAGO MACULATA. Pl. IV, fig. 3.

D. 13/20, A. 2/21, L. lat. 125, L. transv. 11/34.

Height of body eight times in the total length ; length of head nearly one-fourth of same ; head rather convex in front of the eye ; snout more than twice the diameter of the orbit from the eye ; dorsal spines feeble, the second, third, and fourth longest, the thirteenth short ; tail emarginate ; coloration pale yellowish red with numerous black spots above the lateral line, and with a few spots and a spotted interrupted black line below it ; fins spotless. Total length nine inches.

From King George's Sound.

FAMILY BLENNIIDÆ.

4.—TRIPTYERYGIUM MARMORATUM. Pl. III, fig. 2.

D. 3/14/12, A. 22, L. lat. about 35.

Height of body one-tenth of the total length ; head large and nearly vertical in front ; teeth in front of lower jaw longer than the others ; eyes close together with a deep groove between extending to the snout ; the first dorsal fin commences over the præoperculum ; the pectorals extend to the sixth anal ray, lateral line not continued to the tail ; caudal a little rounded ; colour yellowish, much mottled with black, particularly on and above the lateral line ; dorsal, pectoral and caudal fins with small brown spots disposed in rows. Length 4 inches.

Three specimens, King George's Sound.

FAMILY LABRIDÆ.

5.—*LABRICHTHYS NIGROMARGINATUS*. Pl. III, fig. 3.

D. 9/11, A. 3/9, L. lat. 27.

A posterior canine tooth ; height of body one-third of the total length ; head rounded between the eyes, slightly concave on the snout, and covered with granules, with a very narrow line of scales a little behind the eye, and a few large ones on the extremity of the operculum.

The color in spirits is a greenish yellow, with the fins yellow, the dorsal and anal narrowly edged with black, the pectorals broadly tipped with black, and the three first rays of the ventrals of the same hue. Length of specimen 11 inches.

Taken in Port Jackson.

6.—*TROCHOCOPUS RUFUS*. Pl. V, fig. 3.

D. 12/10, A. 3/11, L. lat. 45.

Height of body one-third of the total length without caudal fin ; all the teeth conical and strong ; head convex above and below ; the eyes more than their diameter distant from one another, and from the snout ; præoperculum finely serrated behind and clothed with small scales excepting a narrow posterior margin, and a broad inferior one ; dorsal spines short, strong, and equal, shorter than the rays ; caudal fin truncate ; colour greenish brown on the head, and bright red on the body and tail ; the other fins reddish yellow ; the first three spines of the dorsal fin with their membranes, and the tips of the other spines black. Length 14 inches.

Two specimens from King George's Sound.

In the serration of the præoperculum, and the number of the anal rays, this fish differs from the generic characters given of the genus *Trochocopus* by Dr. Gunther, but in other respects it so closely answers to it that I have not thought it necessary to form a new genus for its reception.

7.—*OLISTHEROPS BRUNNEUS*. Pl. V, fig. 1.

D 17/10, A 11, L. lat. about 56.

Head entirely naked, the operculum terminating over the pectoral fin in a triangular skinny flap; second ray of pectorals reaching as far as the sixth dorsal spine; tail crescent shaped, the two outer rays elongate; height of the body one fifth of the total length; length of the head the same; broad and flat between the eyes; colour almost uniform olive brown. Length 13 inches.

Found in Port Jackson.

8.—*HETEROSCARUS CASTELNAUI*. Pl. V, fig. 2.

D 14/9, A 3/11, L. lat. 36.

Height of body one-third of total length; head scaleless, pitted, covered with small pores, and roundly pointed at the snout; a few large scales on the posterior part of the operculum; upper jaw protuding over the lower; præoperculum finely serrated; the first four dorsal spines longest, and terminating in a filament, but not so long as in *Heteroscarus filamentosus* Casteln; soft dorsal and anal fins, enveloped at their base in a scaly sheath; tail slightly emarginate; colour in spirits yellowish with some brownish patches; there are three narrow blue lines on the head—one from the back of the eye to the angle of the operculum, another below the eye in the same direction, and the third from the mouth to the angle of the præoperculum; the soft dorsal and anal fins are spotted. Length 8 inches.

Taken in Port Jackson.

I have named this species after the founder of the genus, and the most distinguished of our naturalists—the Count de Castelnau.

FAMILY CLUPEIDÆ.

9.—*ETRUMEUS JACKSONIENSIS*. Pl. IV, fig. 1.

B. 15, D. 16, A. 13.

Height of body one-sixth of the total length; mouth small snout rather pointed and not the length of the diameter of the eye, which is one-third of the length of the head; a thin membrane entirely covers the eyes; head with a broad depression, and with a central carina extending from the occiput to the mouth; anal fin very low, caudal forked, pectorals situated well behind the vertical from the dorsal; back dark coloured; sides and belly silvery. Length 6 inches. Caught by the hook in Port Jackson a few days ago.

I regard this fish as distinct from the Japanese species *Etrumeus micropus*. They differ inter alia in the number of the dorsal and anal rays.

FAMILY SCLERODERMI.

10.—*MONACANTHUS GUTTULATUS*. Pl. IV, fig. 2.

D. 32, A. 30.

Skin very finely granular; greatest height of body about one-third of the total length; eye nearly six diameters from the snout; profile straight; lower jaw protuding beyond the upper; dorsal spine above the middle of the eye, with four series of nearly equal barbs; pectoral fin situated beneath the anterior margin of the orbit; ventral spine very small; tail rounded with four acute rather small spines pointing backwards on each side of the root—the spines yellow and placed on yellow spots; the colour in spirits is of a yellowish olive, densely marked all over with small blue spots; the mouth is black, and there are numerous blue streaks on the fore part of the body—somewhat vertical on the head, and horizontal on the thorax; a raised black line near the base of the dorsal and anal fins, and on the base a black scaly sheath, with a yellow membranous line beyond. Length 10 inches. One specimen from King George's Sound. In some respects this species seems to resemble *Monacanthus Yagoi* of Castelnau.

Notes on "LIST OF AUSTRALIAN BIRDS,"

By E. P. RAMSAY, F.L.S., &c.

ANAS GIBBERIFRONS, Mull.

Since offering some remarks on this species in my list of Australian Birds, published in a former number of these "Proceedings" (see Vol. II, pt. 2, p. 209), I have, through the kindness of Captain Hutton, Curator of the Otago Museum, N.Z., been enabled to examine a specimen of *Anas gibberifrons* (Mull.), shot in the Wellington district, in New Zealand.

At first sight there appears no appreciable difference between the New Zealand Bird, and the female or young male of our N. S. W. *Anas castanea* (*A. punctata*, Gould. Bds. Aust., Vol. VII, pl. 11); in fact the birds might readily pass for one and the same species. On close examination, however, I find that the feet are smaller, the length of the toes being less; the shield or flattened portion of the bill at the forehead is also smaller, narrower, and its lateral margins meet the culmen sooner, or at a greater angle, in the New Zealand Bird than in the Australian *A. castanea*. The width of the shield in *A. gibberifrons* is 0.3, width of culmen between nostrils 0.15; the shield in *A. castanea* is 0.43 in width, and the culmen between the nostrils 0.22. In *A. castanea* the tarsus is 1.55, and the middle toe 1.85; in *A. gibberifrons* the tarsus is 1.25, and the middle toe 1.7. These proportions will of course vary in different individuals and sexes, and are therefore, on the whole, of little importance.

The only other difference I notice is the width of the white or buff margin of the secondaries, which is wider in the Australian than in the New Zealand species.

Perhaps when a large series of the New Zealand birds be examined these differences may be found to be constant, if not, then I am afraid the *Anas gibberifrons* of Muller and *A. castanea*, Eyton, are one and the same species. It is stated that the adult males of *A. gibberifrons* resemble the females in plumage, but so few have fallen into the hands of naturalists that this point has by no means been satisfactorily determined. Although it is rare, even in districts frequented by our Australian Teal, to obtain

adult males in full plumage, yet when the breeding places, and strongholds of the New Zealand bird be found, adult males in the summer plumage, resembling that dress of the N. S. W. birds, may nevertheless be procured. I trust some of our New Zealand ornithologists will give this matter the attention it deserves, for it will be important to note the form of the *sternum* and *trachea*, with its *bullæ osseæ*, both in the male and female. In *Anas castanea* the *bullæ osseæ* is said to be found in both sexes. (See *P.Z.S.*, 1871, p. 649).

GERYGONE FLAVIDA, *Ramsay. P.L.S., N.S.W., Vol. II., p. 53.*

I have lately seen specimens of a *Gerygone* from the North East Coast, which seem to indicate that my *Gerygone flavida* is only the female of Mr. Gould's *Gerygone personata*; but notwithstanding the great similarity in size and plumage, further proof will be necessary, as we have lately received the adults, male and female, of *G. flavida*, shot on taking their nest and eggs, and three males examined are exactly alike in plumage to the female; but it is not improbable that the young males of *G. personata* resemble the females in plumage, and breed before attaining the adult male livery. No specimens, however, in the plumage of the adult ♂ of *G. personata* have been obtained yet from Rockingham Bay.

Additional New Species, &c.

Habitat.

CRATICUS SPALDINGI, <i>Masters., P.L.S.,</i> N.S.W., Vol. II., p. 271	Port Darwin
EOPALTRIA NANA, <i>Ramsay., P.L.S., N.S.W.,</i> Vol. II., p. 373	Rockingham Bay
PTILOTTIS GERMANA, <i>Ramsay, P.L.S., N.S.W.,</i> Vol. III., p. 2	Islands of Torres Straits and S. Coast of New Guinea
MAJAJQUEUS PARKINSONI, <i>Gray., Voy. Ereb.</i> and <i>Terr.</i>	East Coast of Australia
ZOSTEROPS WESTERNENSIS, <i>Quoy et Gaim. Voy.</i> <i>Astrol., Pl. 11, fig. 4, Zool. Ois., p. 215 ...</i>	West Australia
= ? <i>Zosterops gouldii</i> , from same Habitat	

CORRIGENDA.

- No. 190 for *E. GRISEOGULARIS*, Gould,* read *E. gularis*, Quoy et Gaimard.
 „ 191 „ *E. GULARIS*, Quoy et Gaim., read *E. georgiana*,† Quoy et Gaim.
 „ 565 „ “*OPHTHALMICUS*,” read *ophthalmicus*.
 „ 577 „ “*MONARCHUS*,” read *monachus*.
 „ 658 Foot Note.* For P.Z.S., 1871, p. 65, read p. 649.
 „ 703 for “*ACQUILUS*,” read *aquilus*.

MEMORANDA.

- No. 588 = *TRINGA CRASSIROSTRIS*, Tem. & Schleg.
 „ 595 = *R. NOVÆ-HOLLANDIÆ*, Vieillot, *N. Dict. d'Hist. Nat. III.*,
 p. 103 (1816).
 „ 606 = *FALCINELLUS IGNEUS*, Lath.
 „ 607 = *CARPHEIBIS SPINICOLLIS*, Jameson.
 „ 608 = *IBIS ÆTHIOPICUS*, Lath.
 „ 638 = *HYPOTENIDIA AUSTRALIS*, A. von. Pelzeln, *Ibis*, 1873, pp. 42, 43.
 = *H. philippensis*, Bp. = *Rallus pectoralis*; Gould, *Bds.*
 Aust. VI, pl. 76.
 „ 668 See Coues, *Proc. Nat. Hist. Phil.*, 1872.
 „ 685 = ? *S. PARADISEA*, Brunn. = ? No. 681 (*S. dougalli*).
 „ 704 = ? *M. EQUINOCTIALIS*, Linn.

EXHIBITS.

Drawing of Trilobites, from Yass Plains, by C. Jenkins, Esq.

Photographs of Brachiopods, exhibited by Rev. J. E. Tenison-Woods, F.G.S.

Lithographs of Fishes described by the Hon. W. Macleay, F.L.S.

Painting of *Monacanthus granulatus* by the Hon. W. Macleay, F.L.S.

Specimens of *Anas gibberifrons*, by E. P. Ramsay, Esq., F.L.S.

Mr. Macleay drew attention to a Paper read lately before the Linnean Society of London, by Dr. Manson, “On the Mosquito considered as a Nurse,” in which it is shown that disease caused by a *Filaria*, not uncommon in hot climates, results from drinking

* Gould, P.Z.S., V, p. 144 (1837).

† Q. et Gaim., Voy. L'Astrol. Zool., p. 175 (1830).

water containing the excreta of Blood-sucking flies ; and that one portion of the Life History of the *Filaria* is passed in the body of the fly from which, by one means or another, it makes its re-entrance into the human body.

MONDAY, JUNE 24TH, 1878.

The Hon. W. MACLEAY, F.L.S., in the Chair.

MEMBER ELECTED.

Mr. FRENCH, of the Botanic Gardens, Melbourne.

DONATIONS.

From the Royal Society of N. S. W. : Journal and Proceedings for 1877.

From the New Zealand Institute : Transactions and Proceedings for 1877.

From Harward College, U. S. : Bulletin of the Museum of Practical Zoology.

From Dr. Schomburgh : Catalogue of the Plants in the Botanic Gardens, Adelaide ; Report of the Botanic Gardens, Adelaide.

From La Société Entomologique de Belgique : Compte Rendu Serie II, No. 50.

Phylloxera Vastatrix, by K. I. Staiger, F.L.S., Brisbane.

Pituri and Duboisia, by Dr. Bancroft. By the authors.

PAPERS READ.

Notes on the Fishes of the Norman River.

By COUNT F. DE CASTELNAU.

The Norman River flows into the Gulf of Carpentaria, and a small settlement has of late years been formed on its banks, about twenty miles from its mouth.

Mr. Gulliver, who has resided two years in this settlement, and has done much for the zoology of that remote part of Queensland, has sent me two collections of fishes from this river, and Mr. Staiger, the curator of the Brisbane Museum, has placed in my hands a collection he had also received from the same collector. I have thus been able to determine twenty-five sorts, the greater part of which appears to me to be new. They are as follows:—

- Lates calcarifer*, Bloch.
- Pseudoambassis Macleayi*, Cast.
- „ *elongatus*, Cast.
- Accanthoperca gulliveri*, Cast.
- Gulliveria fusca*, Cast.
- „ *fasciata*, Cast.
- Therapon fasciatus*, Cast.
- „ *terræ-reginæ*, Cast.
- „ *caudovittatus*? Richard.
- Corvina albida*, Cuv. Val.
- Scatophagus multifasciatus*, Rich.
- Toxotes curpentariensis*, Cast.
- Kurtus gulliveri*, Cast.
- Periophthalmus australis*, Cast.
- Gobius sauroides*, Cast.
- Eleotris simplex*, Cast.
- „ *planiceps*, Cast.
- Mugil dobula*, Gunther.
- „ *compressus*, Gunther.
- Arius australis*, Gunther.
- Plotosus elongatus*, Cast.
- Belone kreffti*, Gunther.
- Engraulis aasutus*, Cast.
- Chataesus erebi*, Gunther.
- Leuciscus australis*, Cast.

LATES CALCARIFER.

- Lates calcarifer*, Bloch., pl. 244.
- Lates nobilis*, Cuv. Val., vol. II, p. 96, pl. 13.
- Holocentrus heptodactylus*, Lacep., vol. IV, p. 391.

The præopercle presents at its angles a strong acute spine and three others rather smaller below this; this fish has been known for many years, from the mouths of the great Indian rivers, but it is only lately that it has been discovered in some of the Queensland rivers.* It is found in the Fitzroy river, and is known at Rockhampton under the name of *Burrumundi*, which name also has been erroneously applied to the *Ceratodus* of the Burnett river. It attains enormous proportions and is second in size to none of the Australian fresh water fishes except perhaps to the Murray cod (*Oligorus macquariensis*).

Mr. Gulliver has discovered this sort in the Norman river, and has sent a large specimen to the Brisbane Museum.

PSEUDOAMBASSIS.

I propose this name for some small fishes closely allied to *Ambassis*, but having no recumbent spine in front of the dorsal. They seem to be rather numerous in the northern parts of Australia.

1.—PSEUDOAMBASSIS MACLEAYI. *sp. nov.*

Upper profile high, and convex in front of the dorsal; the two limbs of the præopercle strongly serrated; the upper one on the angle (three or four spines) and on the lower edge; the lower one on all its length; the spines of the inferior edge the largest, and directed backwards; the lower edge of the opercle also lined with similar spines; two lines of scales on the cheeks; the height of the body more than one half the total length without the caudal fin; scales large, numbering about thirty on the longitudinal line, and sixteen on the transverse one; first dorsal with seven spines; the first of which is very short, the second the longest, and nearly as long as the head; the second dorsal with a very long and straight spine and ten rays; caudal very strongly bifurcated, with the ends pointed; anal with three strong spines, of which the third is rather the longest, and ten rays; the colour, after having been in spirits, is of a uniform light brown, with the fins yellow.

Numerous specimens, the largest being under two inches and a half long.

* P. Z. S., 1870, p. 824.

I have much pleasure in naming this sort after Mr. W. Macleay, who bearing the name of one of the most illustrious naturalists of the century, has himself done so much for the zoology of Australia, and who most nobly devotes a large fortune to promote the knowledge of the productions of his adopted country.

2.—*PSEUDOAMBASSIS ELONGATUS*.^{*} *sp. nov.*

Form elongated; upper profile little convex; two lines of scales on the cheeks; upper limb of the præopercle very finely serrated on the corner (four or five) and on the lower edge; the lower limb only serrated on its lower edge; the caudal strongly bifurcated with the ends pointed; the general colour is grey without any yellow tinge.

Several specimens not much over one inch long.

ACANTHOPERCA. *nov. gen.*

One dorsal formed of two equal parts and received in a scaly sheath on the back; scales rather large; opercle ending in an acute angle over the base of the pectorals; præopercle having two ridges; the upper one having two blunt spines at its lower angle, and the lower one being straight at its posterior edge, but strongly serrated at its angle and on its lower edge; præorbital strongly serrated; teeth villiform in both rows, and a few very fine ones on the palatine bones; mouth rather extensile; maxillaries extending as far as the anterior third of the eye; lateral line continuous extending on the base of the tail; dorsal having its two portions about equal; the spinous formed of seven strong spines, the first being very short, the second very long contained only about twice in the height of the body, the others going shorter; the soft portion begins by a long, straight spine, nearly two-thirds as long as the second of the spinous part; the rays number ten, and go on decreasing in height as they extend backwards; caudal strongly bifurcated; anal with three spines, the first of which is short, the second very large, flat, sword-like

^{*} The *Ambassis papuensis*, Macleay Proc. Lin. Soc. of New South Wales, Vol. I, p. 226, pl. V, fig. 4, forms a third sort of this genus. It is very much like my first sort but quite distinct. The profile is less elevated; there is only one line of scales on the cheeks; the præopercle has only one strong spine at its angle; the lobes of the tail are rounded; it has a general orange tint on the dried specimen.

and very pointed ; the third more slender and shorter ; the rays number nine ; the ventrals have a very strong sword-like spine ; the pectorals are rather long.

This genus has much the form of *Ambassis*, but there is only one dorsal.

ACANTHOPERCA GULLIVERI *sp. nov.*

Form compressed, high, strongly arched on the upper profile behind the head ; the lower jaw longer than the upper one ; eye large, contained three times and a half in the total length of the head ; height of body twice in the total length without the tail ; lateral line arched and extending on the base of the tail, covering about forty scales, the transverse line of about twenty scales. The specimens are in a dry state, and I can say nothing of the colours except that there are on the back traces of longitudinal black lines.

My largest specimen is about eight inches long.

GULLIVERIA. *nov. gen.*

Teeth on both jaws very numerous, short, conical, pointed, swollen and rounded at the base, placed irregularly and crowded ; no canines ; tongue smooth ; an angular line of teeth on the palate ; præopercle either without any denticulations or with very feeble ones ; opercle with a flat soft spine ; two dorsals ; the first with six spines, the second with a long spine ; anal with two spines ; general form oval, compressed ; scales moderate or rather large ; lateral line continuous, not extending on the caudal ; maxillaries extending to the posterior edge of the eye ; opening at the mouth rather oblique.

This genus belongs to the *PERCIDÆ*.

1.—*GULLIVERIA FUSCA*. *sp. nov.*

Body oval, rather elongate ; contained nearly three times in the total length without the caudal fin ; head twice and three quarters in the same length ; eye three times and three quarters in the head ; snout as long as the diameter of the eye, obliquely truncated in front, shorter than the lower jaw ; upper part of the head with strong and deep impressions ; all parts of the head

covered with scales; lateral line running over about forty scales; these rather large and ciliated on their edges; first dorsal placed over the middle of the length of the body, having six strong spines of which the first alone is very short, and the second the longest; the second dorsal is well separated from the first; it is formed of one slender spine and ten rays; the caudal is rather long and truncated; the anal has two spines, one very short, and one long and slender, and nine rays; the ventrals have a strong spine and are situated below or a little in front of the pectorals; colour entirely brown. Length a little over four inches.

2.—*GULLIVERIA FASCIATA*. *sp. nov.*

Body a little more elongate than in *G. fusca*; lower limb of the præopercle distinctly serrated; back of a light brown colour, lower parts of silvery; four black transverse bands extend from the back to the side; one below the first dorsal, one below the second, another on the middle of the tail, and the last on the end of this organ. Length a little over three inches.

THERAPON FASCIATUS, *Cast.*

Therapon fasciatus, Cast. Researches on Fishes of Australia, 1876, page 11.

I described this species from a specimen from the Swan river, but I find several in Mr. Gulliver's collection from the Norman river; these are preserved in spirits and in a much better state than those I had seen previously. I find that the dorsal has, apart from the twelve spines of its first portion, a long straight one belonging to the soft part; the caudal has its lower edge black and three very faint transverse bands. The transverse bands of the body extend to about two thirds of its height.

THERAPON TERRÆ-REGINÆ, *Cast.*

Therapon terræ-reginæ, Cast. Proc. Lin. Soc. N. S. W., vol. II, page 227.

The specimen on which I formed this species is not now in my possession having been returned to the Brisbane Museum, so I cannot compare the specimens that I have from the Norman river with the type; but I have very little doubt that they belong to the

same species; the soft dorsal seems to be subject to considerable variation in the number of its rays, as in a large specimen I find ten, in others nine, and in one only eight.

This species is nearly allied to *Therapon argenteus* of Cuvier, on which this naturalist formed the genus *Datnia*.

THERAPON CAUDOVITTATUS.

There is a rather large specimen dried and in a very bad state that seems to belong to this species.

CORVINA ALBIDA, Cuv.

Corvina albida, Cuv. Val. vol. V, page 93.

„ „ Gunther Cat. vol. II, page 309.

I was much surprised to find this Indian and Chinese species in a river of northern Australia. It attains a considerable size but this specimen is only twenty inches long. It is remarkable for the very large, sword-like spine of its anal fin.

SCATOPHAGUS MULTIFASCIATUS, Rich.

Scatophagus multifasciatus, Richard. Ereb. and Terr. or, p. 57, pl. 35.

In the specimens from the Norman river the spines of the first dorsal are alternately very broad or slender. I had for some time thought these formed a distinct species, but this fact is observable in several other fishes of the same family. If this distinction proves to be constant I propose to distinguish this sort under the name of *S. allermans*.

TOXOTES CARPENTARIENSIS. sp. nov.

Resembles very much *T. jaculator*, and still more *T. microlepis*, but the dorsal is a little more forward, as by a perpendicular drawn from its base, the pectoral would be cut at more than one-fourth of its length; this dorsal is much lower, the longer spines being contained three times and three-fourths in the height of the body; these spines number six, all slender; the third and fourth being the longest; the rays number twelve; the caudal is forked; the anal has three feeble spines and sixteen rays; the length of the snout considerably less (two thirds) than the space between the

orbits, or very little more than the diameter of the orbit. Having seen only one specimen nine inches long, preserved in salt, I can say nothing of the colours.

NOTE.—There are in the collection two very young specimens, about an inch long, that I believe to belong to this sort; they are preserved in spirits and show distinctly four broad transverse dark bands on the body.

KURTUS GULLIVERI, Cast.

Kurtus gulliveri, Cast. Proc. Lin. Soc. of N. S. W., vol. II, p. 233.

This curious fish was found by Mr. Gulliver in a fresh water pond near the Norman river.

PERIOPHTHALMUS AUSTRALIS, Cast.

Periophthalmus australis, Cast. Researches Austr. Fishes, p. 22.

Several small specimens about two inches long; having been in spirits, the colour is slaty gray, with the belly white.

GوبيUS ? SAUROIDES. sp. nov.

It is with some doubt that I place this fish in the genus *Gobius*. It has the form, and nearly the dentition of a SAURUS. The body is elongate, its height being contained five times in the total length, without the caudal; the head is three times and a half in the same; the eyes are small and directed upwards; the lower jaw is considerably longer than the upper one; on this there are two lines of sharp, elongate, conical teeth, the inner one directed backwards, and the outer one formed of rather strong canines placed at some distance from one another; on the lower jaw there is in front, a line of large, strong, curved canines, and on the sides a double line of them; numerous depressions cover the upper side of the head, which is entirely naked, except on the upper part behind the eyes where the scales are small; on the body there are thirty seven series of scales on the longitudinal line; these are large, angular, ciliated, and covered with striæ; and also several series of small ones at the end of the tail; first dorsal with six spines, second with eight rays; anal with ten; the second dorsal and the anal have their last rays prolonged; caudal rather long, pointed; the ventrals separate except at the base and placed on a disk; pectorals extending to the twelfth line of scales; the scales on the lower side in front of the ventrals

are very small. The colour, after having been preserved in spirits, is of a light yellow brown, darker on the upper surface; the fins except the ventrals and pectorals, have lines of small dark spots. The specimen is seven inches long.

ELEOTRIS SIMPLEX. sp. nov.

Enters in Gunther's division, characterised by scales rather large; snout short, depressed; general form a very long oval; snout flat on its upper surface, shorter than the diameter of the eye; aperture of the mouth rather oblique; maxillaries much shorter than the anterior edge of the eye; head entirely scaly except on the snout; height of body contained four times in total length (without the caudal) and equal to the length of the head; body scales large, about twenty-eight on the longitudinal line; they are finely striated on their surface and ciliated on their edges; first dorsal of six rays or soft spines; second of one spine and ten rays; the last of these are high, and extend considerably further than the base of the caudal, which fin is pointed; anal having the same form as the second dorsal with one feeble spine and ten rays.

The only specimen is preserved in liquor; it appears to have been yellow with the dorsal, caudal and anal marbled with brown. Three inches long.

ELEOTRIS PLANICEPS. sp. nov.

Belongs to the division characterised by scales large, snout broad and flat; eight series of scales between the origin of the first dorsal and the anal; height of body contained three times and two-thirds in the total length without the caudal; head very flat, covered, except on the snout with minute scales; the eye is small and contained nearly six times in the length of the head; the lower jaw is rather prominent; the maxillary extends to nearly the verticle from the posterior margin of the eye; teeth villiform in broad bands on both jaws; body covered with large scales, numbering thirty three on the longitudinal line; the body is very convex with the tail long; first dorsal low, of six rays; the second dorsal higher of nine rays; the caudal long and pointed;

anal with one spine and eight rays; pectorals extending to the base of the anal; preserved in liquor the fish appears black with the fins lightly marbled with yellow.

The specimen is three and a half inches long.

MUGIL DOBULA, Gunth.

Mugil dobula, Gunth. Cat. vol. III, page 420.

Head moderately broad; body of a long oval; pectorals not extending to the perpendicular drawn from the base of the dorsal; an adipose eyelid. This species has been observed in several rivers in New South Wales.

MUGIL COMPRESSUS, Gunth.

Mugil compressus, Gunth. Cat. vol. III, page 49.

Body very much compressed, very high at the base of the first dorsal; head nearly pointed; no adipose eyelid.

Inhabits also the rivers of New South Wales.

ARIUS AUSTRALIS, Gunth.

Arius australis, Gunther Proceedings of the Zool. Soc. 1867, page 103.

The largest specimen is about seven inches long; the caudal is very strongly forked; general colour silvery; the upper parts scaley.

NOTE.—The specimen described by Dr. Gunther was much larger, and came from the Hunter river.

PLOTOSUS ELONGATUS, Cast.

Plotosus elongatus, Cast. Proceedings Lin. Soc. of N. S. W., vol. II, page 237.

Two specimens about eight inches long; colour of a dark brown with the lower parts silvery.

NOTE.—There are also several very young and immature specimens of a *Silurid* belonging, I believe, to the genus *Plotosus* but having the end of the caudal slightly rounded and not prolonged as in the preceding species.

BELONE KREFFTII, Gunth.

Belone krefftii, Gunth. Cat. vol. VI, page 250.

A very large sort, remarkable for its compressed tail; the head is contained twice and a half only, in the total length without the caudal fin. The largest specimen is over 22 inches long.

ENGRAULIS NASUTUS. sp. nov.

Height of the body contained rather more than three times in total length without caudal; the head four times and a half in the same length; snout obtuse produced projecting considerably beyond the lower jaw;* teeth very fine on both jaws; maxillary considerably prolonged; origin of the dorsal fin at the centre of the body without the caudal; this fin is strongly forked; there are twelve rays at the dorsal; anal long, formed of 32 rays, extending considerably behind the dorsal; abdomen compressed and entirely spiney; I can say but little of the colours of this species, of which I have only seen one adult specimen seven inches long, but I have a small specimen preserved in spirits, which is silvery with the upper parts of a light brown, fins yellow.

CHATOSSUS EREBI.

Chatossus erebi, Gunth. Cat. vol. VII, page 207.

„ *Come*, Richard. Ereb. and Terr. p. 61, pl. 38.

Found in the Brisbane river and also in the rivers of northern Australia.

LEUCISCUS ? AUSTRALIS. sp. nov.

Body elongate, very compressed; its height contained four times in the total length without the caudal; head nearly five times in the same length; lower jaw longer than the upper one; no teeth on the jaws nor on the palate; eye rather large, contained three times and a half in the length of the head; maxillary extending to the exterior third of the eye; lateral line continuous on the upper third of the body; scales of moderate size; dorsal fin placed in front of the middle of the length of the body of fourteen rays; caudal bifurcated; anal fin inserted a little behind the end of the dorsal, of eighteen rays; the ventrals a little in front of the dorsal; pectorals inserted below the opercle. The fish is of an orange colour becoming yellow on the belly; the head is silvery no definite band on the side; length of the type specimen about one inch and a half.

NOTE.—The specimen is very small and not in a very good state, and I may be mistaken about the palatine teeth; all I can say is that I can see none.

* On the upper surface of the head extends a strong longitudinal ridge.

On a new species of *HOPLOCEPHALUS*, from Sutton Forest,

By WILLIAM MACLEAY, F.L.S.

I am indebted to C. S. Bransby, Esq., of Moss Vale, for a species of *Hoplocephalus*, lately captured by him somewhere in the Sutton Forest country.

I find it to be quite distinct from any of the species hitherto known or described.

I subjoin a somewhat detailed description of the snake, which I propose to name in honour of its discoverer.

HOPLOCEPHALUS BRANSBYI.

General form rather robust and cylindrical, the tail tapering to a very fine point. Head scarcely broader than the neck, rather flat and short, and rounded at the muzzle; vertical shield twice as long as wide and six-sided, the two anterior facing the posterior frontals, and nearly in a straight line; the two posterior converging to a rather rounded angle, and those abutting on the parietal shields parallel. The posterior frontals are large, five-sided, and separated from the second upper labial by the nasal and anterior oculars, the side abutting on the nasal being very short. The anterior frontals are short (one third the length of posterior), form a very straight suture with the posterior frontals, and are prolonged into an acute angle between them and the nasals. Nasal shield twice as long as high, with the nostril small and in the middle, and the angle formed by the rostral and anterior frontals very acute. Rostral shield low, not reaching the dorsal surface of the head. The anterior ocular shield pentagonal and emarginate in front; both posterior oculars small, the inferior one largest. The superciliary shields are nearly as broad as the vertical; the occipitals are large and divergent behind. The fourth lower labial very large. All the head shields more or less covered with minute granules. The eyes are moderately large, pupils round. The scales of the back are in 15 rows before the middle of the body, and in 17 rows behind, and are all of elongate form with the apex a little rounded, except the two outer lateral rows which are broad and

much rounded at the tip. The abdominal plates are large and number 150. The anal plate is single; the subcaudals number 47. The colour on the upper surface is olive brown, with a narrow reddish yellow band rounded anteriorly behind the head, preceded by a still narrower blackish band, and a black vertebral line one scale wide along the whole length of the body from the neck. The under surface is yellow, each abdominal plate having a blackish margin, and the whole becoming darker towards the tail. The scales of the outer or lateral row are yellow, with a black mark on each side, forming two black stripes extending to the tail; the scales of the next row have each a reddish spot near the base. The head is entirely yellow below the mouth, above only the labial shields and small portions of the anterior ocular and other plates are yellowish. The total length is 17 inches.

The number of species of this genus now known is about 25, varying in length from six feet to less than one foot, all highly venomous, and, as far as my experience goes, seeming to belong almost exclusively to the temperate regions of Australia. They are abundant in Tasmania, Victoria, South Australia, Western Australia, and New South Wales. Several species also are found in Queensland, but not, I believe, north of Port Denison, and I have never in the many collections of snakes I have had from the Endeavour River, Cape York, and Port Darwin, seen a single example of the genus. It is stated, however, by Mr. Krefft, whose work on the Snakes of Australia cannot be too highly praised, that *Hoplocephalus curtus* has been found as far north as the Gulf of Carpentaria.

On the other hand the genera *Diemenia* and *Pseudechis* seem to get more numerous in the tropical parts of Australia. Of the four species of the latter genus described, three, *P. australis*, *scutellatus*, and *Darwiniensis* are intra-tropical, and I have a fourth species from Port Darwin of large size, over six feet long, with the vertical shield more elongate and triangular than in *P. Darwiniensis*.

I may mention here that I saw a few days ago a fine specimen of *Dipsas fusca* procured by Dr. J. C. Cox, from the Mudgee district, a very unlikely place one would suppose for a snake of its habits.

I take this opportunity also of correcting a mistake of mine in a previous paper. In page 221 of Vol. II. of our Proceedings, I gave the name of *Elapocephalus* to a new genus of snakes from Port Darwin. I find that Dr. Gunther had previously (Cat. Brit. Mus., Snakes, App. 2, p. 276) used the same name for a genus of South American Snakes of a very different family. I propose now to substitute the generic name *Elapocranium* for the Port Darwin Snake.

On the power of locomotion in the *Tunicata*.

By WILLIAM MACLEAY, F.L.S.

A few weeks ago I found the sandy beach at Elizabeth Bay, strewn at low water, with a number of large Ascidian Mollusks. In this there is nothing remarkable, the severe storm of the 2nd of this month, having no doubt torn from their hold on the rocky or sandy bed of the sea, these helpless masses.

But I have observed with some astonishment that these masses are, or seem to be, capable of a certain amount of locomotion.

What I have observed is, that these large Ascidians do change their positions most undoubtedly; that in doing so they leave upon the wet sand a distinct track in accordance with the weight and size of the mass; and that these movements are not in any way attributable to winds or waves. I at first thought it possible that the movements might be due to the agency of some of the animals adhering to the outside of the mass, but I found that the only organic attachments, excepting a few small shells, were clusters of simple Ascidians, utterly incapable therefore of combined action, and much too small for their individual efforts to produce any effect.

Notwithstanding, however, this apparently convincing evidence, I am indisposed to believe it possible that an animal so completely shut up in a thick coriaceous unmuscular sac, can have any power of external movement, nor is it likely that such a power would be possessed by an animal whose whole life (except in infancy) has to be passed firmly rooted to the bottom of the sea. I hope that some one having the leisure and opportunity, will endeavour to solve this problem.

On some AUSTRALIAN LITTORINIDÆ.

By the Rev. J. E. TENISON-WOODS, F.L.S., F.G.S., Corr. Memb.
Linn. Soc. N.S.W., &c.

We have in Australia and Tasmania certain coast shells which are variously distributed in several genera by different authors. They all resemble each other in this, that they are found for the most part on rocks which are seldom covered by the tide. They are not nacreous. They have a horny operculum, with a marginal nucleus and few whorls, and the animal has a small round foot which has never tentacular filaments like the *Turbo*, *Trochus*, or *Phasiapella*. They are generally widely distributed, subject to very much variation, according to the locality where they are found. This has led to the same shell being regarded in different places as a different species, and the varieties also have been regarded as different species. In order better to understand the present state of our knowledge of these marine mollusca, it may be as well to state the history of the genus, or rather its classification. To Linnæus all these shells were *Turbos* and those which were known to Schrötter, Chemnitz, Gmelin, Favanne, Born, Humphrey, and Lamarck, came under the same generic appellation. In 1821 M. Baron Ferrussac, in his large and expensive work on the fresh water shells of France (so large and so expensive that it was never finished), divided the genus *Paludina* into five sub-genera. He gave the fifth the name of *Littorina* (written also with one t, or two r's by various writers), and included in that the common perry-winkle *Turbo littoreus* of

Linnæus (*Lit. vulgaris* of Sowerby's Genera of shells). This division of M. de Ferussac was not well understood, nor was it generally adopted. M. de Blainville (in his *Hist. Nat. de Vers testacees*, Paris, 1822, vol. I, p. 347), made another distribution of the species indicated by his predecessor which he regarded as a section of his large genus *Turbo*. Latreille subsequently in his work on the animal kingdom (*Familles du Regne Animal*, Paris, 8vo, 1825), only cites this genus and the relations given by its author, but ignores it in his classification. Although G. Cuvier was very slow in adopting new genera, nevertheless he adopted that of *Littorina* in the second edition of his *Animal Kingdom* (*Regne Animal par G. Baron Cuvier*, 10 vols., Paris, 1828). But in doing this he hardly can be said to have understood the relations of the animals, for he placed the genus following the fresh-water genus *Paludina* and next to *Monodonta*. I am quoting Deshayes on this matter, who adds (*Hist. Nat. des Animaux s. vertebres*, 2 edit. par Deshayes and M. Edwards, vol. IX, p. 200, note), "Unfortunately when Cuvier published the second edition of this work science was not in possession of facts sufficiently numerous or well enough established on the general relations of Linnæus' large genera of *Turbo* and *Trochus*, to decide on all the classification of those divisions which had been rightly or wrongly made. It is equally true that Lamarck allowing himself to be guided by his extensive knowledge of the characters of shells was much more happy in the classification of these genera than the most part of other zoologists or than G. Cuvier himself." M. Deshayes then goes on to indicate the changes that were necessary in the classification of Lamarck, arising from the observations which he (M. Deshayes) had made upon molluscos animals. He then adds (page 201, note) "In this matter for the genus with which we are now occupied, we have observed that the animal has characters which easily distinguish it from all known species, and which, while it removes them further from either the *Turbo* or the *Trochus* genus, places them closer to *Scalaridæ*. Thus the animal of *Littorina* crawls upon a small foot with thin edges, oval or sub-circular, and almost entirely

hidden by the shell. When the animal moves this foot bears on the upper part of the posterior side an operculum which is always horny, blackish, pauci-spiral and with a lateral nucleus. This operculum forms from two and a half to three whorls ; it is semi-circular, and has a straight internal edge like the same organ in the genus *Natica*. The foot is very slightly projecting in front, where it is rounded. The head is rather solid, prolonged into a conical muzzle and terminated by a longitudinal slit wherein is placed the mouth ; the head bears two long pointed conical tentacles behind, broad at the base and having at the external side of this base a rather salient, blunt, ocular tubercle. The shells of the genus *Littorina* are easily distinguished from either *Turbo* or *Trochus* because they are never nacreous, and besides the form of the aperture, the flattened and almost trenchant columella, they have peculiar characters of their own. The only difficulty there would be is in separating them from some species of the genus *Phasianella*, if one omits to observe at first that in the latter genus the shells are always very highly polished, and that the operculum is calcareous. Those *Littorina* which approach nearest to *Phasianella* have the columella almost straight and trenchant at its edge, which is never seen in the latter genus. Finally the animals are different ; the *Phasianellæ* in the ornaments of the head and the tentacles of the foot do not differ from the animal of *Trochus*, while the *Littorinæ*, as we have explained, have characters peculiar to themselves, and which approaches the animal of *Scalaria*. Between the opercula of the genus *Littorina* and *Scalaria* there is a good deal of analogy. The animal of *Scalaria* has the head probosciform, the tentacles are more obtuse, shorter in proportion, and the ocular tubercles are a trifle more elevated."

Having premised these particulars, M. Deshayes defines his genus thus :— Gen. *Littorina*, Ferussac. General characters : Animal spiral, moving on a foot thin oval or subcircular ; head probosciform, mouth terminal, anterior ; two conical tentacles, pointed, broad at the base ; eyes large, hardly projecting from the external base of the tentacles ; operculum horny, pauci-spiral

with lateral and submarginal nucleus. Shell turbate, not nacreous, thick, solid, oval, or globular; aperture entire, slightly oblique to the longitudinal axis, angular at the summit; columella large, curved or almost straight, without inner lip, and, as it were, denuded, and almost trenchant at its internal edge.

He adds that the *Littorinæ*, as their name indicates, live almost always on the rocks which fringe the shore. They are almost always out of water, but they are placed so as to receive the surf which breaks over the rocks. They seem capable of resisting in their exposed position the burning heat of the sun, the torrents of fresh water from rivers, or the fury of the waves which break upon the rocks. I may add from my own observation that they are estuary shells, and flourish in brackish or almost fresh water. M. Deshayes remarks that two species of Lamarck's *Monodonta*, *M. pagodus* (Indian Ocean), and *M. papillosa* (Timor), should both be removed to *Littorina*; also a few of the species of Lamarck's *Phasianella*. With regard to the *M. pagodus*, which was brought to Europe from Capt. Beechey's voyage, Mr. E. Gray made it the type of a new genus, *Pagodus*. The animal, however, as well as the operculum, are those of a true *Littorina*. M. Deshayes also removed into this genus three fossils of the Paris basin which he had formerly described as *Phasianella*, viz., *P. tricostrata*, *multisulcata*, and *melanoides*. He was of opinion also that some of the secondary fossils regarded as *Turbo* and *Trochus* should be considered as *Littorina*, notably *T. ornatus* and *carinatus* of Sowerby's *Mineral Conchology*, p. 240.

To these particulars of Deshayes may be added the following facts: The odontophore or lingual ribbon is long and narrow in the case of the Australian species, and I believe I have observed that it is a tube. The greater part is rolled up in a spiral coil at the back of the mouth. It has three simple teeth at each side of the central tooth, which is small. The lateral ones are long, curved, and the two outer ones being tricuspid and the four inner ones bicuspid. The teeth, as well as the

membrane on which they are placed, are colorless, transparent, and glassy. No other molluscan animal, as far as I am aware, has the odontophore coiled up at the back of the mouth.

The shells of the *Littorinas* are for the most part like the typical species, the common perry-winkle of Europe; that is to say they are elongately turbinate with rounded whorls almost destitute of ornament. But there are some with tubercles and granules upon the spire, and with flattened whorls and angular base. These have been erected into other genera by different authors, as I shall show presently, but at present I am regarding as one genus all those shells which would come under the definitions of Deshayes with regard to the shells and the animals.

There is one peculiarity in some members of the genus to which, as far as I am aware, attention has not been drawn by any naturalist, and it is so very common and so peculiar that it must have some relation to the animal economy. I refer to a spiral white or yellow line which lines the interior of the shell, and arises from the anterior aperture, or at the lower part of the labrum or outer lip. I find this peculiarity on the following members of the genus:—*L. grandis* (Sea of Ochotsk, Reeve), Middenof; *L. Africana*, Philippi, Algoa Bay; *L. sicca*, Chemnitz, Monte Christo, West Columbia, and South Australia (Kangaroo Island?); *L. cincta*, Quoy & Gaimard; *L. luctuosa*, Reeve, New Zealand; *L. neritoides*, Mediterranean; *L. granularis*, Gray, Hab. ?; *L. striata*, King, Canary Islands, ita Reeve; *L. Novæ Zelandiæ*, Reeve; * *L. Knysnæensis*, Krauss, Knysna River, Cape; *L. grano-costata*, Reeve, Brisbane; *L. Feejeensis*, Reeve, Feejee; *L. araucana*, D'Orbigny, South America; *L. mauritiana*, Lamk, described as *Phasianella* (= *L. lævis*, Reeve; *L. diemanensis*, Quoy & Gaimard, Chatham Islands; *L. unifasciata*, Gray, Tasmania and S. Australia); *L. melanostoma* (*Bisella melanostoma*, Gmelin, *nana* Lamk.; *vittata* and *lutea aurata*, *plana*, *striolata*).

I shall notice presently what I consider will throw some light upon this curious feature. I now pass on to the manner in which

* The name and the habitat are Reeve's, but no such shell is known in New Zealand. See *Journal de Conchyliologie*, 1878, p. 26.

Littorina has been subdivided by different authors. There are about 200 species at present known. But many of these will need reduction. The following very complete and excellent notice of the family is from Woodward's *Manual of the Mollusca* (Tate's Edition).

Family LITTORINÆ.

Shell turbinated or depressed, never pearly, aperture rounded, peristome entire; operculum horny, pauci-spiral; animal with a muzzle-shaped head and eyes sessile at the outer base of the tentacles; tongue long and armed with a medium series of broad hooked teeth, and three oblong hooked uncini; branchial plume single; foot with a linear duplication in front and a groove along the sole; mantle with a rudimentary siphonal canal; operculum lobe appendaged. The species inhabit the sea or brackish water and are mostly littoral feeding on algæ.

LITTORINA, *Ferussac*.

Shell turbinated, thick, pointed, few whorled; aperture rounded, outer lip acute, columella rather flattened, imperforate; operculum pauci-spiral; lingual teeth and trilobed uncini hooked and dentated; 131 species. He adds, "the perry-winkles are found on the seashore in all parts of the world; in the Baltic they live within the influence of fresh water and frequently become distorted; similar monstrosities are found in the Norwich Crag. The common species (*L. littorea*), is oviparous; it inhabits the lowest zones of seaweed between tide marks. An allied species (*L. rudis*), frequents a higher region where it is scarcely reached by the tide; it is viviparous and the young have a hard shell before their birth, in consequence of which the species is not eaten. The tongue of the winkle is two inches long; its foot is divided by a longitudinal line, and in walking the sides advance alternately. The perry-winkle and the trochus are the food of the thrush in the Hebrides during the winter. The lingual canal passes from the back of the mouth under the œsophagus for a short distance, then turns up the right side and terminates in a coil like spare rope resting on a plaited portion of the gullet. It is 2½ inches long and contains about 600 rows of teeth, the part

in use arming the tongue comprises about 24 rows." Mr. Woodward subdivides the family into 9 genera, viz.:—*Littorina*, *Solarium*, *Phorus*, *Lacuna*, *Litiopa*, *Rissoa*, *Skenea*, *Truncatella* and *Lithoglyphus*. This is not a natural arrangement for many reasons which cannot be entered into here. He arranges the following as subgenera under *Littorina*:—

1.—TECTARIA, Cuvier, 1827.*

Shell muricated or granulated, sometimes with an umbilical fissure; operculum with a broad membranous border.

2.—MODULUS, Gray, 1840.

Shell trochiform or naticoid; porcellaneous; columella perforated, inner lip worn or toothed; operculum horny or few whorled.

3.—FOSSARUS, Philippi, 1841.

Shell perforated, inner lip thin, operculum not spiral.

4.—RISSELLA, Gray, 1840.

Shell trochiform with a flat or convex base; whorls keeled; aperture rhombic, dark or variegated; operculum pauci-spiral.

5.—CONRADIA, Adams, and COUTHROYIA, Adams.

The two latter from small species in the Japanese seas which it is not necessary to refer to now.

This arrangement is nearly that of Adams Brothers, in their genera of Mollusca, only that the subgenera are suppressed and the genera are placed as subgenera with Swainson's *Echinella* and Adams' *Isapis* excluded. Chenu, in his "Manual," follows the arrangement of Adams, but appears from the figures given to confound one genus with another, supposing him to accept the divisions given in the "Genera of Shells."

I do not pretend to pronounce an opinion upon some of these genera. I confine my attention in the first instance to those which have reference to species existing on the Australian coast. And first with reference to the genus *Risella*. The history of the genus has already been given by me in vol. I, p. 242, of the

* There is a dispute about the priority of this name. Valenciennes is quoted by Adams, but his name was *Tectarius*, and Montfort's *Tectus*.

"Proceedings" of this Society. It was erected originally by Philippi for *Littorinae* with acute whorls, and those peculiarities which have already been referred to.

It was noticed by M. Crosse, in the *Jour. de Conchyl.* for 1865, that this diagnosis would hardly warrant a separation from *Littorina*, but he called attention to another feature that had escaped notice, that is to a basal thickening in a kind of thread about the middle of the aperture. He thought also that there were about nine species. In my paper I attempted to show that there is only one species, and since that time have made a careful comparison of an immense number of individuals from various parts of the coast, and having further observed that all the presumed species breed freely with one another, I make no doubt whatever that this genus, if it is to be preserved, can only be said to be represented by one species.* Now as to the basal funicular thickening we find that it does not hold good for all the individuals. It is present and absent on different specimens, but more frequently present on old shells. But it has not been remarked that always by the side of it there is a white or yellow spiral line on the outer and anterior angle of the aperture. This white spiral line or groove, for it is both, corresponds with the line I have called attention to in the turbinate *Littorinae*, and I find that it is a groove along which the organs of reproduction are always exerted, whether they be male or female. I have before shown that this office is variously assumed by different shells. It is not easy to explain why this portion of the shell is differently colored, unless it is in keeping with what is noticed in the coloring of certain flowers, butterflies, &c. The whole of the *Littorinae* have the aperture of dark color, though highly enamelled, and this whitish line is a conspicuous diversity on the appearance, though it would be a very narrow view of the operations of nature to say that its only purpose was to attract. Round the mouth of most *Risella*, and close to this spiral line,

* In the *Annals of Nat. Hist.* for 1852, vol. II, p. 78, Mr. W. Thompson writes that he had observed several examples of small *Littorina rudis* in coitu with *L. littoralis*, and in every instance the male was *L. rudis*. He suggested that perhaps a hybrid resulted, and this was *L. palliata*, but that form did not frequent that part of the coast. The question has not, as far as I know, been followed. A few very simple observations in a small aquarium might lead to important discoveries in such matters.

there are generally a few diagonal yellow lines which make the spot still more conspicuous, especially as the enamel of the rest of the shell is such a thick glossy lining of intense brown, almost like the varnish known as Brunswick black.

The shape of the species and varieties is very uncertain. Sometimes the shell is almost turbate, and the whorls rounded; in others it is depressed, the whorls ovately angular, smooth, and flat; others again are more depressed, and the whorls almost keeled with tubercular undulations on the edge, which become almost spinous. At times also the spire is ornamented with coarse nodular protruberances. Now, seeing all these variations we are bound to enquire on what is the generic distinction to rest. Not on the shape or ornamentation of the spire, nor on the depressed or angular sharpness of the whorls. Not on the funicular basal thickening, for that is uncertain too. In any case it would be a genus with one species, but a species which in no respect can be divided generically, from typical *Littorina*. The animal is the same; the operculum is horny, pauci-spiral, with a marginal nucleus. The odontophore is the same, and curled in a coil at the back of the head; there are no tentacular appendages. The shell is not nacreous, and the habits of the animal are in all respects those of *Littorina*. It lives almost always out of the water, on rocks exposed to the spray. It is found in brackish water, and can bear the extremes of heat and cold.

Messrs. Adams reminds us in the *Annals of Nat. Hist.* that no harm is done to science by the addition of a new genus, and this is quite true as long as it is founded on well defined and permanent features. But if a genus is erected on characters that are slight and uncertain, and if, moreover, they vary and pass insensibly into others, then it is an injury to science and to the student, who will be bewildered in trying to recognise them; an injury also to any sound system of classification. For these reasons, therefore, I think most scientific men will agree with me that the genus *Risella* ought to be suppressed. It has no permanent characters which can be relied upon to separate it

from *Littorina*. It is simply one of our Australian *Littorina*, very determinate and characteristic, though within certain limits very variable. It seems that it has a very wide range, and though specimens from extreme portions of the continent would with difficulty be recognized as the same, yet they are all one species flourishing under different conditions. In thus suppressing the genus *Risella* we are really simplifying the science. I am aware that the principle of suppressing genera which graduate insensibly into one another must not be pressed too far. Thus it would be difficult to draw a distinct line between such apparently well established genera as *Turbo* and *Trochus*. M. Deshayes acknowledged this when he tried to distinguish them by the calcareous or horny operculum, or by their being nacreous or non-nacreous. But all these features are interchanged. A better distinction might be found to rest upon the odontophore or lingual ribbon, but even this is insufficient. But difficulties like these are not in question in the case of a genus with only one species, where the characters on which it is founded appear and disappear in different individuals. *Littorina melanostoma* is, however, a very good and interesting species, and may be taken as one of those forms which give a character to the Australian fauna. It is said to extend to New Zealand, at Auckland, though Capt. Hutton says the locality is doubtful. This species has been re-described in the cruise of the *Novara* as *R. Kielmanseggi*. The following will be the synonymy of the species:—*Trochus in fauce nigerrimus*, *Ohemnitz*, *Conch. Cabinet*, t. 5, p. 20, pl. 161, f. 1,526, a.b. (I cite this and the three following on the authority of Deshayes, in *Lam.* 2nd edit., though far from sure that they refer to the species. †) *Trochus*, *Schrot*, *Einl.* l. 1, p. 682, n. 12. *Trochus melanostomus*, *Gmelin*, p. 3,581, No. 90. *Dillwyn Catalogue*, b. l. 2, p. 797, No. 89. *Deshayes Lamark*, Vol. 9, p. 157, No. 78. *Trochus nanus*, *ibid.*, p. 150, No. 67. *Littorina luteola*, *Quoy*, *Voy. de l'Astro.* tom. 2, p. 477, pl. 33, f. 47. *Risella aurata*, *Quoy*.; *Risella nana*, *Quoy*.; *R.*

* † *Risella varia*, Hutton, is given by him as *Adeorbis* in *Jour. de Conch.*, 1878, p. 27, Vol. —. Marten considers it a *Risella*.

† It may be that the origin of the name is from Reeve, *Proc. Zool. Soc.*, 1842, p. 186, as *Trochus*.

plana, Quoy.; *R. lutea*, Quoy.; *R. Bruni*, Crosse; *R. lutea*, Philippi, Adams; *R. vittata*, Philippi; *R. imbricata*, Gray, Phil., Adams; *Bembicium nanum*, Philippi; *B. pictum*, ditto; *Littorina Australis*, Gray; *Trochus cicatricosus*, Jonas.

In addition to the above named *Littorina* we have the following cited by various authors as occurring in Australia and Tasmania: *L. mauritiana*, Reeve; *L. unifasciata*, Gray, Appendix 1. 2 vol. of King's Voy. in Australia, p. 483; *L. paludinella*, Reeve, Icon. pl. 16, fig. 84; *L. Hisseyana*, mihi, Proc. Roy. Soc., Tas., 1875; *L. Philippi*, Carpenter, Cat. Magellan Shells, p. 349; *L. ziczac*, Chemnitz, t. 5, p. 69, pl. 166, f. 1,600; *L. diamanensis*, Quoy. and Gaimard, Voy. de l'Astrol., t. 2, p. 479, pl. 33, f. 8-11; *L. pyramidalis*, Quoy. and Gaim., loc. cit. 6, p. 482, pl. 3, f. 12-15; *L. undulata*, Gray, loc. cit.; *L. Australis*, Gray in King, loc. cit.

Some of these shells call for no remark, as they are either doubtful *Littorinae*, or too little is known about them. *Littorina mauritiana* is, however, one about which there is much to be said. It is a rather elongated turbinated shell, with rounded whorls, the last nearly as long as all the others combined. It is generally of a bluish color, but ranges from pale blue to the faintest bluish white. It is also sometimes spirally banded with faint blue or white lines, or it is longitudinally striated with zig-zag lines of dull green, or reddish lines. At the base of the last whorl there is a very obtuse angle, scarcely perceptible in some shells—very visible in others. Some of the shells are globose, with a very short and acute spire, while the last whorl is immensely disproportioned to the rest. This variety has often the zig-zag dull green lines. The shell varies in size from 5 mil. to 25 in height. The small sizes are young, and of a smalt blue. All these varieties may be obtained from the same patch of rock. It is common everywhere on rocks above high water mark. I have found no difference in its characteristics in Guichen Bay (S. A.), Port Jackson, and the extreme south of Tasmania. Perhaps the South Tasmanian specimens are a little smaller.

I cannot see any specific difference between this shell and *L. Africana* Philippi, and considering that our common shell is identified with the one that occurs at the Mauritius, it is easy to

believe that they are one and the same. Indeed, it is very easy to bridge over any interval when we find such a deep and open sea as that which intervenes between Australia and the Mauritius bridged over by the same species. I believe it to be also identical with *Littorina diemanensis*, Quoy (*Voy. de l'Ast.* t. 2, p. 479, pl. 33, f. 8, 11). Of this species M. Deshayes says, after quoting the habitat of Quoy, which is simply Van Dieman, "The *Littorina* of Dieman is absolutely the bluish *Turbo* of Lamarck," which is a *Littorina*, or as now known *L. cærulescens*. It is found, he adds, in the Mediterranean, and on the English Channel. The only slight difference that M. Deshayes could observe was the presence of certain striae which the European specimens have not, but I can answer that the Australian species are as often without them. "The individuals are in general larger (he is referring to the Australian shells.) Shell short, slightly swollen at the base, the spire is pointed. The color is sky blue, with an irregular band, rather darker in the last whorl. The aperture is rounded, a little angular, and of a sombre violet within. Its colors are much more brilliant under water than when exposed to the air. It is 11 millim. long, by 6 wide. So far with regard to the Tasmanian species. It is also said to occur in N. Zealand. Captain Hutton has sent me the shells which receive this name (*L. diemanensis*). They came from Dunedin (nearly 46° S. lat.), a very cold station for a shell whose finest and largest examples are found at Port Jackson, or even as far north as lat. 30 S. Consequently, as we might expect, the Dunedin specimens are sordid and dwarfed. The bands of color are far more definite, and the blue, or rather neutral tint predominates over the white, while at Port Jackson the white predominates. The mouth is much darker in the Dunedin shells, and the angle less marked at the base of the last whorl. This is the rule, but intermediate examples can be found at both places. The Port Jackson shells have the last whorl larger than the spire, which is short and tumid. The spire is longer and not tumid at Dunedin, but with rounded whorls. It seems to me that the Dunedin shells may be taken as an intermediate stage to *Littorina cincta*, Quoy, which is the common form on the Dunedin coast, and at the Bluff, N.Z.,

and is synonymous with *L. luctuosa*, Reeve. The most important difference between *L. diemanensis* and *L. cincta* is in the operculum. This organ in the former animal is paucispiral with the nucleus marginal. The whorls also are not only few but oblong. The striae are fine, and the appearance delicate. In *L. cincta* the operculum is many whorled, but not so many as in *Trochocochlea Australis*. They are circular, rugged, irregular and coarse, and the nucleus is nearly central. In this respect *L. diemanensis* resembles it. In fact, *L. cincta* is only a large *L. diemanensis* dark and sombre in color, rugged and sordid in appearance. The operculum no doubt partakes of the rugged character of the shell. I do not say they are the same species, but I think it would not be difficult to find a series passing insensibly from one species to the other, and I strongly incline to the opinion that *L. cincta* is *L. diemanensis* in a very much colder climate, on an exposed and rocky coast.

But is *L. diemanensis* the proper name for our Australian specimen? In a note on the *Turbo caeruleus* of Lamarck, Mr. Deshayes says (Lamarck, 2 edit., Vol. 9, p. 217)—“This shell belongs to the genus *Littorina*. It is a species very common on the shores of the Mediterranean. It clings to rocks beaten by the sea, but above its level when calm. Naturalists must find it difficult to determine which is the *Nerita littoralis* of Linné. Those who consult the quoted reference in Lister's History of the Animals of England, p. 164, cannot fail to recognize the *Turbo caeruleus* of Lamarck, but those who only consult the figures named in the synonymy of Linné will see that *Nerita littoralis* is the same species as *Turbo neritoides*. But the confusion increases when we read that it is very common and very variable in color on the rocks of the seas of Europe, and that a smaller variety frequents the fresh waters. It is evident that under the name of *Nerita littoralis*, Linné confused three species at the least; *Turbo caeruleus* and *T. neritoides* doing double duty and probably *Neritina fluviatilis*. Gmelin simplifies Linné inasmuch as he suppresses the reference to Lister, p. 154, and reduces the synonymy to the figures which represent *Turbo neritoides*. Consequently Gmelin's *N. littoralis* is a second employment of *Turbo*

neritoides. Dillwyn gives to the *Turbo neritoides* quite a different signification from even Linné. He only admits one of the references which is only Gualtieri, fig. F, plate 45. This figure would agree well enough with the *Turbo cœrulescens* of Lamarck, but cannot in any way be referred to the Linnean species."

I have deemed it necessary to refer at length to this question of synonymy in case any of the older works on the citation of Linné should be consulted. Our *L. diamanensis* should on M. Deshayes' authority be considered the same as *L. cœrulescens*. This also is the same as *L. mauritiaina*, *unifasciata*, *Africana*, and a host of others. If we believe that only one species ranges between the Cape of Good Hope and Australia then the synonymy will be something enormous.

But does it not seem strange that a shell should fringe our coasts on the Southern Hemisphere and be found quite as common on the north coasts of the Mediterranean, &c., while no sign of its existence can be traced in the intermediate regions. It does seem somewhat unusual and singular, but we have similar facts in Botany. Every one knows for instance the showy purple Loosestrife (*Lythris salicaria*), which is such a conspicuous object in marshy places in Europe. With its companion *Lythris hyssopifolium* it is widely distributed in Europe. Well, when R. Brown landed in Tasmania and began to explore where European feet had surely never trodden before, one of the first things he noticed in the marshy places was the purple Loosestrife of Europe. It was not long before he had found *L. hyssopifolium*, growing with its companion just under its well-known conditions. Such instances might be multiplied, and probably they hold good in the insect world, and in the higher order of animals. It seems as if each country or each province has its particular fauna which is peculiar in its resemblances as well as its differences, and besides all this has a certain amount of features which are the same for every portion of the earth's surface under similar conditions. And moreover it seems to me that the true clue to this fact is one which neither the evolution theory or the "station or dispersion" theory will completely explain. Our Newton of natural science is yet to come, the zoologist of the future, who

shall discern the law which pervades all nature and reads it so that the anomaly of to-day should be the confirmatory fact of to-morrow.

In keeping with the above fact we have *Littorina ziczac*, which is a shell very much like our *L. cœrulescens* except that it is streaked with undulating red lines. This is a common form in some of the West Indian Islands, at Monte Christo in West Columbia, and is not uncommon on Kangaroo Island in South Australia, and on other parts of the South Australian coast. My own idea is that it is only a variety of *L. cœrulescens*. I do not assert this positively, but I am inclined to think it. The extraordinary variations to which shells are subject in the matter of color makes one prepared for anything. *Trochocochelea australis* is variegated light green and white, dark olive and yellow, reddish brown and yellow, and finally a uniform dull black or greenish black. *T. constricta* is dull white, dull yellow pale flesh color, or streaked a bright green and white, red and yellowish green, neutral tint and white, or black and white. Then the shape of these variegations are just as diverse. The streaks are sometimes three or four, or they are narrow pointed and numerous, or they are very fine zigzag lines, the angles of the zigzags being very acute and the lines long or few and obtuse, &c., &c. In fact, within given limits, there is no form or pattern of color that might not find representatives in these most variable shells. If color then be the only difference, I think we should claim *L. ziczac* too as a synonym for our *Littorina*, but the animals I have not examined and have only imperfectly examined the shell.

Next to *L. cœrulescens*, for such I shall always now designate our common coast periwinkle, we have a species called *Littorina pyramidalis*, by Quoy. (*Voy. de l'Astrolabe*, vol. 2, p. 482, pl. 33, fig. 12-15). He states that "it was found in Jervis Bay, and is remarkable for its pyramidal form, with the last whorl much swollen, and seems a base from which the spire rises abruptly." It is rough girdled with a string of tubercles on the spire, and which is doubled on the summit of the last whorl. These tubercles are prominent, round and blunt. It shows some

irregular longitudinal folds on the outer edge of the lip. The aperture is small, round, but somewhat irregular; is highly enamelled, a deep purple brown color, and there are two spirally yellowish lines running up the throat, one at the base or anterior as already described in other *Littorina*, and the other between the suture and the posterior line of tubercles, but just at the edge of the latter. The columella is very much depressed, sharp, as in all the genus, dilated and almost channelled at the anterior end. The color is a bluish grey, the tubercles white, and the spire reddish. In all matters of detail it is absolutely a *Littorina*. It is often spirally striated. The operculum is of four neat ovately rounded whorls, and not quite so marginal as in our other species, but still almost posterior, and at the columellar edge. The lingual ribbon lies in a coil at the back of the head. The coil is very conspicuous and round, whereas in *L. caerulea* it is not so easily seen when the animal is drawn out of its shell, as the coils are fewer, oval, and the membrane which covers it is thicker. The teeth on the ribbon are like all the genus, but it seems to me that the radula itself is broader and longer. The organs of respiration and reproduction call for no especial notice, except that they are on the typical plan of *Littorina littorea*. The muscular tissue of the body is thin and transparent, and very favorable for microscopic examination. The nervous ganglia and the neural branches are very plainly visible by transmitted light with an inch objective.

With the exception of the shell there is nothing to separate the species from the typical *Littorina*. Messrs. Adams separates it, and probably also Gray, on the ground of the tuberculations on the shell. They notice other differences, such as a callosity on the anterior lip generally, and a few-whorled operculum which has also a broad membranaceous edge. Whether these particulars apply to all the members of the genus except this one I cannot say. They do not apply to this. The operculum has four whorls, but there is no membranaceous edge, such as is very visible in our *Trochocochlea*, and there is no callosity on the lip. And I respectfully submit that if they were there they are not sufficient as generic distinctions. They are at most sub-

generic, and considering how many are absent from our species I don't think we are justified in going further than Mr. Woodward proposes, that is writing this species in future thus—*Littorina* (*Tectaria*) *pyramidalis*, Quoy.

The following *Littorinæ* (*Tectaria*) are described in Reeve and Chenu possessing tubercles on the spire. The type is *L. pagodus*, which resembles our shell in the granules being disposed in a double line on the upper part of the body whorl, and in a single line on the spire. *L. bicolor* is another very similar; *L. bullata*, Zanzibar, North Australia, and Reeve adds New Zealand, but this is an error; *L. coronaria*, Phillip Islands; *L. tectum persicum*, *L. spinulosa*, Singapore; *L. lemniscata*, Cuba, but with *L. malaccana*, Pulo-Penang, so like our *L. pyramidalis* that the identity is strongly suspected by me. *L. cumingii*, Phillip Islands; *L. dilatata*, Cuba; *L. subnodosa*, Red Sea; *L. muricata*, West Africa, Cuba; *L. vilis*, which Reeve gives as from New Zealand, but Capt. Hutton assures me there is nothing like it. It looks very much like a young specimen of our *L. pyramidalis*, and considering that Reeve misquotes Quoy, and gives New Zealand as the habitat of our shell instead of Van Dieman, we may certainly erase *L. vilis* from our lists. * *L. feejeensis* (?) Feejee; *L. natalensis*, Natal; *L. trochoides*, hab. ? *L. granosa*, Guinea.

To sum up the results of this paper my conclusions are:—

1. That the *Littorinidæ* of Australia so closely resemble the genus *Littorina* of Europe that they cannot be generically separated from it.

2. That the genus *Risella* should be suppressed, as no permanent generic character can be defined in it, and there is only one species which is extremely variable.

3. That the species known to some authors as *Tectaria pyramidalis* is merely *Littorina*, with a double line of granules, which feature does not entitle it to generic distinction, since it shows it with many other species. If it be considered as belonging to the sub-genus, it should be remembered that it is destitute of many of the defined characters of *Tectaria*.

* There are many mistakes in the habitats of Reeve, which strongly dispose one to think that they arose from his regarding Van Dieman's Land as a part of New Zealand.

4. That our *Littorina mauritiana* is probably identical with the *Littorina caerulea* of Europe, and that *L. ziczac*, *unifasciata*, and *undulata* are merely varieties.

5. That all of our species have in the anterior aperture a groove or line, often conspicuously light in color, which is in some way connected with the organs of reproduction.

Descriptions of five species of new Birds, from Torres Straits and New Guinea, &c.

By E. P. RAMSAY, F.L.S.

On a supposed new species of LORY, allied to *LORIUS HYPOCHROUS* of Gray, from Cloudy Bay, South Coast, New Guinea.

Lorius hypochrous (G. R. Gray) var.

Head and nape deep black, abdomen and a broken band across the interscapular region black, with a faint violet tinge; a narrow line of crimson feathers round the back of the neck; a black band across the interscapular region, the lower portion mottled with crimson feathers; the back, rump, upper tail coverts, and the basal half of the tail feathers both above and below, the flanks, breast, chest, sides of the head and throat, and the under wing-coverts, rich crimson, the concealed parts of the breast and chest feathers becoming yellow near the base; thighs and under tail-coverts deep violet blue, the apical half of the tail feathers olive yellow below, blackish violet-blue above. Wings above green, blackish on the margins of the shoulders; the scapulars tinged with olive chiefly on their outer webs, the primaries and secondaries deep green on the outer webs, the former becoming blackish at the tips, the latter black on the tips of the inner web; all the wing quills deep bright yellow on the inner webs from near the tip to the base, the yellow covering the whole of the under surface of the wing except at the end of the primaries. Fleshy skin saving the eye purple; bare line at base of mandibles yellowish. Bill coral red, deepest at the base; legs and feet black.

Total length, 10·4 in.; wing, 6·7; tail, 4·5; tarsus, 0·9; bill from forehead, 1·2; Culmen, 1·3.

Hab., Cloudy Bay, South Coast, New Guinea.

This species of Lory comes very close to Dr. Gray's description of *Lorius hypenochrous*, but differs in having the whole of the abdomen black, and a black band across the interscapular region, and in the color of the under tail-coverts; also in the concealed yellow spot near the base of the breast and chest feathers; but notwithstanding these differences this may however hereafter prove to be only a very old male of *Lorius hypenochrous*; should it, however, prove distinct, I am desirous it should bear the name of *Lorius Gulielmi*, in honor of S. B. Williams, Esq., of the Paradise and Victoria Nurseries, London, who has so liberally equipped Mr. Goldie for his botanical explorations in New Guinea, from whom I have received this specimen.

Pitta novæ-hibernicæ. sp. nov.

From the Rev. George Brown's collection, obtained in New Ireland and the Duke of York Islands, the Museum purchased a *Pitta*, which, until lately, I considered to be a young female of *Pitta mackloti*, of Temm. Signor D'Albertis, however, pointed out that this could not be the case, and showed me a fine series in his collection from the Fly River. I have also examined young of both sexes in the Dobroyde collection, and in that of the Australian Museum, where the young of *P. mackloti* distinctly show the black coloring on the throat and the black line which separates in the adult, the broad blue chest-band from the crimson of the breast and abdomen. The New Ireland bird, for which I propose the name of *Pitta novæ-hibernicæ*, resembles *P. mackloti* very closely, but the black on the throat, and the black band below the blue on the chest is not found; the forehead and crown of the head are of a dull brown, washed with rust-red; the occiput and nape are of a bright rust-red; sides of the head and throat dull rusty-brown, ear-coverts and narrow line of feathers over the eye blue, like the chest; all the under surface crimson, but of not quite so deep in tint as in *P. mackloti*; the back and remainder of the plumage, and the

white spots on shoulders and the primaries, the same as in that species. Bill, dark brown; legs, brownish grey.

Total length, 6 inches; wings, 3·2; tail, 1·5; tarsus, 1·55; bill from forehead, 1·05, from gape 1·15.

Hab., New Ireland.

Pachycephala fuliginata. sp. nov.

Adult male. The whole of the head, lores, ear-coverts, sides of the neck, and a broad band across the chest, sooty black; the throat, breast, under wing-coverts, abdomen, flanks and under tail coverts, and a narrow line at the base of the tail feathers on the inner web, white; tail above blackish brown; the centre two tail feathers margined and tipped and the remainder slightly margined at the base on the outer web only with bluish ashy-like the back; brown below; very narrow blackish shaftlines down the feathers on the back. Wings blackish brown above, the margins of all the feathers on the outer webs bluish ashy-grey; lower part of the hind neck, wing-coverts, shoulders, back rump and upper tail coverts bluish lead-grey; the basal portion of the wing feathers on the under surface, margined with white on their inner webs; bill, black; legs and feet blackish lead color.

Total length, 6 inches; wing, 3·5; tail, 2·7; tarsus, 0·73; bill from forehead, 0·7.

The black of the ear-coverts is joined to that of the chest by a broad black band down the side of the neck.

Hab. South-East coast of New Guinea.

This species is about the size of *P. rufiventris*, and resembles *P. leucogastra* of Salvadori and D'Albertis, but has no transverse vermiculations on the back.

Pachycephala collaris. sp. nov.

The whole of the head and nape black; pectoral band black, narrow, joining the ear-coverts; round the back of the neck from the breast a distinct deep yellow collar; all the remainder of the upper surface olive; quills of the wing blackish brown, margined on the outer webs with ashy-grey, on the inner at the base with white; wing-coverts above blackish, broadly margined

with olive-grey; throat white, all the remainder of the under surface, and the under and tail and wing-coverts bright yellow; tail olive-brown above, dull brown below; bill black; legs dark brown.

Total length, 6 inches; wing, 3·7; tail, 2·7; tarsus, 0·95; bill, 0·9.

Hab. Courtance Island, South-East coast, New Guinea.

Adult female. Crown, sides of the head, neck, and all the upper surface dull brown, of an earthy tint; wings blackish brown, margined with lighter brown; tail dull earthy-brown above, lighter below; ear-coverts rich earthy-brown, which color becoming lighter extends to the sides of the chest, and forms an indistinct band across it; throat to the chest white, breast and abdomen deep yellow; under tail-coverts paler yellow, under wing-coverts white, washed with yellow. Bill, black; legs, lead-grey.

Total length, 6·3 in.; wing, 3·5; tail, 2·6; tarsus, 1·1; bill, 0·9.

I have provisionally described this bird as the female of *P. collaris*. It may hereafter prove to be a distinct species.

Stigmatops albo-auricularis. sp. nov.

Adult male. All the upper surface of the body, head, wing and tail, dull brown, faintly, mesially shaded with darker tint; the wing-quills above narrowly margined with olive, below the inner webs margined with white; axillaries white; sides of the face, sides of the neck, chest, breast and upper part of abdomen, mottled with white and brown; the feathers themselves brown, with white margins on either side, but give the appearance of a white ground with rows of triangular spots of brown; under tail-coverts and flank-feathers whitish, mesially shaded with brown; below the eye and the ear-coverts are covered with minute silvery-white feathers; bill, black; legs, lead-blue.

Total length to tip of bill, 5 inches; wing, 2·7; tail, 2·4; tarsus, 0·7; bill, 0·9.

This species comes near to *Glyciphila Caledonica* of E. R. Gray, but has no olive except on the wings; the spots on the breast are continued on to the abdomen.

Hab. South-East coast of New Guinea.

EXHIBITS.

Mr. Macleay exhibited a beautiful coloured drawing by Mr. Murray, of a species of *Medusa*, which had been lately abundant in Port Jackson. He stated that he had never seen the animal before, and that none of the fishermen of the port remembered having seen it; but that he had no doubt that it was the *Pelagia panopyra* of Lesson, a species abundant in the tropical Atlantic. He also remarked that the eight filaments attached to the outer rim of the umbrella were annulose, like an annelid, and capable of great extension and contraction. For some weeks they had been very numerous in all parts of the harbour, but had completely disappeared after the storm on the first and second of this month. Mr. Macleay also exhibited a specimen of *Argonauta argo* with the animal, caught in Port Jackson; also drawings of *Trilobites* by Mr. C. Jenkins, from the Upper Silurian beds of Yass; also coloured drawings of an *Aplysia* and two species of *Monacanthus* from Port Jackson.

Mr. Ramsay exhibited a few rare birds collected by the Museum Collector (Mr. Alexander Morton) who accompanied Mr. Goldie's expedition to the south coast of New Guinea; also some birds which he had lately received from the north-west coast of New Guinea, including the following species:—*Parotia seerpennis*, *Paradisia raggiana*, *Loris hypenochrous*, (var.), *Janthænas Rawlinsoni*, *Ptilopus perluta*, *Ptilopus cornulatus*, *Tanysiptera Galatea*, *T. Carolinæ*, *Pitta maskloti*, *Pitta Novæ-Hibernicæ*, *Pitta Novæ-Guinææ*, *Campephaga melas*, *Pachycephala fuliginata*, *Pachycephala collaris*, also a new species of tortoise and some birds, believed to be new, from Mr. Goldie's collection, which will be described hereafter.

MONDAY, JULY 29TH, 1878.

The President, W. J. STEPHENS, Esq., M.A., in the Chair.

MEMBER ELECTED.

The Secretary announced that Baron N. de Miklucho-Maclay had been elected an Honorary Member of the Society.

DONATIONS.

From the Société Entomologique de Belgique : *Compte Rendu Serie II.*, No. 51.

From Baron F. Von Müller : *Organic Constituents of Plants*, by Dr. Willstein, translated by the Donor.

From Dr. R. Schomburgk : *Forest Tree Planting and its influence on Climate*, by the Donor.

From Baron Miklucho-Maclay : *Anthropologische Bemerkungen ueber die Papuas der Maclay-Kuste in Neu-Guinea ; Ueber Brachycephalität bei den Papuas von Neu-Guinea ; Ethnologische Bemerkungen ueber die Papuas der Maclay-Kuste in Neu-Guinea ; Do. do., Part II. ; Meine Zweite Excursion nach Neu-Guinea, 1874 ; Einiges über die Dialecte der Melanesischen Völkerstämme in der Malayischen Halbinsel ; Ethnologische Excursionen in der Malayischen Halbinsel, Nov., 1874—Oct., 1875.*, by the Donor.

BARON MIKLUCHO-MACLAY advocated the establishment of a Zoological Station, near Sydney, and explained the benefits to scientific research afforded by such institutions. The suggestion was warmly supported by the Rev. J. E. Tenison-Woods, F.G.S., &c., and other members of the society.

PAPERS READ.

Descriptions of seven new species of Terrestrial and Marine Shells from Australia. By JOHN BRAZIER, C.M.Z.S., Corr. M. Roy. Soc. Tas., &c., &c.

* 1. *HELIX BEBIAS*, NEW SP., pl. 8, fig. 1.

Shell umbilicated, depressly-globose, thin, obliquely finely granulated, fulvous, ornamented with one rather broad chestnut band on the centre contiguous to the suture, above the centre two thread like lines; suture dark lined, crenulated; spire sub-conoid, rather obtuse at the apex; whorls $5\frac{1}{2}$, rather convex, the last slightly descending in front, rounded at the periphery, convex at the base, umbilicus small, dark broad chestnut band encircling it; aperture nearly diagonal, lunately circular; peristome bluish brown; margins approximating, columellar margin broadly reflected concealing half of the umbilicus.

Diam. maj. $17\frac{1}{2}$, min. 13., alt. $10\frac{1}{2}$ lines.

Hab.—Garden Island, Rockingham Bay, Queensland. (*Mr. C. E. Beddome.*)

* 2. *HELIX ZEBINA*, NEW SP. pl. 8, fig. 2.

Shell imperforate, rather solid, somewhat globosely-conical, whole surface transversely granulated with lengthened grains (as seen under the lens), towards the apex they become finer, pale straw-yellow with numerous spiral chestnut lines and bands; suture ornamented with a rather broad band; spire rather large, broadly conical, obtuse; whorls $5\frac{1}{2}$, rather convex, last large, dilated and produced in front, deflected above; aperture diagonal, ovately-lunate, whitish within; peristome straight, expanded and slightly reflected; margins approximating joined by a thin callus; columellar light brown thickened and expanded covering the whole of the umbilicus.

Diam. maj. 19, min. 13., alt. $13\frac{1}{2}$ lines.

Hab.—Ranges about the Douglas River, Queensland. (*Mr. C. E. Beddome.*)

* 3. *HELIX BALA*, NEW SP., pl. 8, fig. 4.

Shell umbilicated, conoidly semi-globose, moderately solid, nearly smooth, bright chestnut; spire conoidly-convex, above light brown; apex obtuse, suture slightly crenulated; whorls 5, slowly increasing, the last large, roundly convex, descending in front;

* The species marked with an asterisk are in my collection.

flattish at the base, aperture nearly diagonal, roundly-lunate; peristome moderately thickened and reflected, interior flesh tinged; margins approximating; columellar margin broadly expanded covering one half of the umbilicus and joined by a thin callus to the upper margin.

Diam. maj. 17, min. $13\frac{1}{2}$, alt. 11 lines.

Hab.—Castle Hill, near Townsville, Cleveland Bay, Queensland. Also, Magnetic Island. (*Mr. C. E. Beddome.*)

* 4 *HELIX MAZER*, NEW SP., pl. 8, fig. 5.

Shell with the umbilicus nearly covered, globosely turbinated, rather thick, minutely granulated, obliquely striated, ornamented with spiral chestnut lines and bands, darker and more rugose at the suture; whorls $5\frac{1}{2}$, slightly convex, last large and descending in front; spire conical, apex obtuse; aperture diagonal, ovately lunate; peristome thickened and rather broadly reflected, interior of aperture blue black, margins approximating and joined by a thin callus, the right deflected above near the centre; collumellar margin rounded and expanded into a broad plate partly over the umbilicus.

Diam. maj. 19, min. $14\frac{1}{2}$, alt. 15 lines.

Hab.—Waterview Scrubs near Cardwell, Rockingham Bay, Herbert River, Queensland. (*Mr. C. E. Beddome.*)

The specimens of this species from the Herbert River run all very small; those from the coast range scrubs are very large and conical, having very thick lips with dark chestnut behind.

* 5. *HELIX NICOMEDE*, NEW SP., pl. 8, fig. 6.

Shell umbilicated, depressly globose, very thin, shining, distinctly obliquely striated and granulated throughout, light brown, encircled with one pale yellowish band just showing above the suture; whorls 6, slowly increasing, moderately convex, scarcely descending in front; periphery with faint keel, base convex, smoother than the upper surface, aperture diagonal, roundly lunate; peristome white, simple, straight, margins scarcely approaching, expanded and reflected anteriorly, columellar margin rather broadly reflected on to the body whorl.

Diam. maj $18\frac{1}{2}$, min. 15., alt. 12 lines.

Hab.—Cardwell, Rockingham Bay, Queensland, Gould Island in Rockingham Bay. (*Mr. C. E. Beddome.*)

- * *Var. a.*—Thinner, darker in color on the upper surface, granulation finer, light yellowish band following the suture spirally to the Apex.

Diam. maj. 13, min. $10\frac{1}{2}$, alt. 8 lines.

- * *Var. b.*—Thicker, light straw yellow, upper surface granulated obliquely rugosely striated, keel more distinctly seen on the periphery; peristome scarcely reflected at the columellar margin.

Diam. maj. $11\frac{1}{2}$, min. $9\frac{1}{4}$, alt. 7 lines.

The two varieties come from Gould Island, and are much smaller than those from the Mainland.

* 6. *HELIX BEDDOMÆ*, NEW SP., pl. 8, fig. 7.

Shell umbilicated, globose, inflated, very thin, distinctly obliquely striated, granulated from left to right, taking somewhat of a zig-zag form, smoky yellow, with a chestnut band under the suture, having a faint broad one above, giving it a darker color; body whorl from the periphery, dark chestnut; spine somewhat globular, suture smooth; whorls $5\frac{1}{2}$, slightly convex, slowly increasing, the last roundly convex, descending a little in front; aperture nearly diagonal, roundly lunate; peristome below slightly raised somewhat in the form of a small obtuse callus like tooth, bluish white, very little expanded or reflected; margins rather distant, joined by a thin bluish white callus; columellar margin broadly expanded and reflected on the umbilicus.

Diam. maj. 23, min. 18, alt. 17 lines.

Hab.—20 miles north-west of Cardwell, Rockingham Bay, Queensland, in the ranges at an altitude of 3,500 feet. (*Mr. C. E. Beddome.*)

This beautiful shell is very thin, the granulations on its surface are distinctly seen with the naked eye, some run straight, some oblique or zigzag; the sculpture can only be compared to a fine double cross-cut file. The species is allied in color to *Helix bipartita*, Fer.

7. *VOLUTA BEDNALLI*, NEW SP., pl. 8, fig. 3.

Shell ovately fusiform, longitudinally distinctly striated, white, with four reddish brown transverse bands, the upper just beneath the suture, one above being much finer; spire rather elevated, apex obtuse; ornamented with rather broad waved longitudinal reddish brown lines breaking off in the centre in the form of blotches; whorls 6, convex, the last forming nearly the whole of the shell, aperture narrow, white within; columella straight, covered with a thin callus, furnished with four plaits, the two upper being nearly transverse, the lower two nearly oblique.

Length 39, diam. 15 lines.

Hab.—Port Darwin, north coast of Australia. (*Mr. William Thompson Bednall*).

Only a single specimen of this fine species has been obtained, its peculiar regular longitudinal thread-like striæ, and transverse and longitudinally waved reddish brown bands breaking off into blotches in the centre on the dorsal surface, mark a species that will never get confused with such species as *piperita*, *Macgillivrayi*, *Ruckeri*, *Kingi*, *Scilateri*, *Angasi*, *undulata*, *Turneri*, *volva*, *reticulata*, *Reevei*, *Lorcesi*, and *Ellioti*.

I take great pleasure in naming this after its owner, Mr. W. Thompson Bednall, a zealous collector of shells from North and South Australia.

On *Bulimus Dufrenoyi*.

By the Rev. J. E. TENISON-WOODS, F.G.S., F.L.S., Hon. Cor.
Mem. Linn. Soc., N.S.W., &c., &c.

Plate VII.

The process of describing and cataloguing various representatives of our Australian fauna has proceeded so far that I think the time has come when we can commence to call attention to the many variations to which species are subject, probably also, to reduce considerably the number of species and even genera. No one can question that a very great number of our species will have to be reduced as observations are extended; and in no department will this be more necessary than in that of the land

shells. Yet it must not be imagined that this is due to a fault in the observers or to any recklessness in the multiplication of species. In some cases, it has been from the necessary difficulties attending scientific observations in a new country. I don't mean as to synonymy, or the description by two persons each unaware of the other's labours, but the necessarily incomplete manner in which observations must be made in the first instance. Thus an explorer may find one or two specimens of a shell which is very common and subject to great variation. Another may find the variety and regard it a species. No one can blame the observer. He is doing what is best for the interest of science. He remarks certain differences, and, if they are valid and important, he has no right to assume that the species with which he has to deal is specifically one with some other. He should in the interest of science state his suspicions and point out the resemblance, and when intermediate varieties have been found, but not until then, the group should be united, and the variation described. The material for doing this is rapidly accumulating in our hands. And perhaps as it does so, it may not be out of place to remark that the greatest consideration and respect should be shown to the pioneers of science. It is a great temptation to young observers to glorify themselves at the expense of the mistakes of their predecessors, or on the superior knowledge which has accumulated since their time. But they little realize how very large is the debt that we owe to those men, and how their labours, incomplete or faulty as they may have been, represent an amount of care, study, industry, and zeal that we cannot easily command at the present. Perhaps I may be pardoned for transcribing a remark of Dr. Philip P. Carpenter on this subject, which will have all the more weight as it comes from one of the most eminent conchologists of later times. He says, "An instructive lesson in candour and forbearance may be learnt by comparing together the works of any two naturalists of equal celebrity, or by comparing either of these with the types. With the best desire for accuracy and the greatest care, it is hardly possible for an author to describe so that his readers shall

see shells as he sees them. If this be true of such full and precise diagnosis as those of Adams and Gould, how much greater must be the difficulty to foreigners of recognizing shells from the brief descriptions of Broderip, Lamarck, and the older writers generally.”*

I make these remarks because in the species with which I propose to deal it will be seen that different authors have described differently even when those authors were of such high authority, as Quoy and Gaimard, and Baron Ferussac; and I trust, as our Australian science advances, and as old errors are cleared away, the philosophers to come will as much distinguish themselves by modesty, patience, justice, and candour, as zeal industry, and self sacrifice have adorned those who have passed away.

The variations on the shell I now call attention to are instructive in another way. They show peculiarities which mimic even generic differences in marine shells. Shape, color, and size are often relied upon as specific distinctions, and in many instances no doubt they are. But in *Bulimus Dufrenoyi*,† the size varies in an extraordinary degree, and so does the color, but within certain limits. If it were not for those limits, the shape would lead us astray, for it varies from almost cylindrical to globular. But the lip is at times sinuous to an extent which would make it like a *Daphnella* among marine shells. All these variations in what is undoubtedly the same species are not dependent either upon climate or station, and they point to one useful conclusion, which is, that land shells may vary so widely and completely that there is no antecedent improbability that our numerous species may be found to belong to a comparatively few specific types.

The shell now under notice belongs to the genus *Bulimus* (*Βουλιμια* great hunger or voracity) which was erected by Scopoli in 1786.‡ I need not give any reference to the host of

* Review of Prof. C. B. Adams Cat. of the Shells of Panama, by Philip P. Carpenter, B.A., &c. Zool. Soc. Proc. June, 1863.

† Written *B. Dufrenoyi* by Quoy and Gaimard, in order, I suppose, more completely to Latinise the name.

‡ In his *Delicias Faunae at Flor. Insubr.*, according to Brugiere but more probably in the *Introd. ad Hist. Natur.*, Prague, 1777.

genera included under this name but it was probably adopted from Adanson (*Hist. Nat. du Senegal. Ooquillages. Paris 1757*), and included *Limnæa*, *Bithynia*, and *Succinea*. It is now restricted to ovo-viviparous land shells, oblong and turretted in form, and with the longitudinal margins unequal, toothless, or dentate, columella entire, revolute externally, or nearly simple; peristome simple or expanded. The species are very numerous, and they are divided into many genera and subgenera by various authors. Some copy the etymology of Adanson and write "*Bulinus*," but Messrs. Adams restrict this to fluviatile shells as probably its author intended, and they define their *Bulinus* thus: "Shell solid sub-imperforate, or with the perforation covered, oval, or ovately oblong, last whorl ventricose equalling the spire; aperture oblong oval, columella rather straight, rarely plicate; peristome thick, expanded, reflected and sometimes arcuate, the margins joined by a callus, the columella dilated, reflected.*" They thus restrict the genus to those species proper to tropical America. They make a genus named *Placostylus* which they derive from Beck† in which they place imperforate shells, oblong-conic, rugosely striated, last whorl a little shorter than the spire, aperture oblong, oval, or irregular; columella tortuous, arcuately plicate, peristome thick, reflexly expanded, the margins united by a shining tuberculated callus, the columellar (margin?) dilated, appressed‡. The genus would seem to come very close to *Auricula* in appearance. Its geographical range according to the authors is the Australian Islands, New Caledonia, and Australia. But none of the species enumerated by the authors occur in Australia. The sub-genus *Caryodes*, Albers,|| was adopted by them from the author just named, for solid imperforate oblong oval shells with plaits at the suture, the last whorl equalling the spire, a rather straight columella and a simple obtuse peristome. They include in this section *Bulinus Baconi* Benson (*Ann. Nat. Hist.*, vol. 13, p. 19, 1854) and *B. Dufrenoyi*. Dr. Cox, in his *Monograph of Australian Land Shells*,§ very properly removes *B. Baconi* from

* *Genera of Recent Mollusca*, vol. 2, p. 146.

† *Index. Mollusc. Principis Christ. Frederici*, 4-to, Hafn., 1837.

‡ *Adams loc. cit.*, p. 153, pl. 75, fig. 5.

|| *Helicæen, Albers, Leipzig*, 1860, 2nd edit., p. 228, Genus *Buliminus*.

§ P. 72.

the subgenus as it is perforate, but he includes in it another species *Bulimus Angasianus*, described by Pfeiffer in the *Zool. Soc. Proc.*, 1863, p. 528. I shall now proceed to notice the remarks of the more important authors on *B. Dufresnii*. It may be remarked in passing that Albers included his *Caryodes* as a subgenus of *Buliminus* Ehrenberg, which was for ovate or ovately conical thin land shells, whose ovate aperture did not reach or did not exceed the whole length, with a peristome often expanded, unequal margins and a narrow simple columella.

Bulimus Dufresnii was originally described by Leach, in the *Zoological Miscellany*, vol. 2, page 153 to 154, and plate 120. Dr. Leach, as most readers are aware, was a curator of the British Museum, whose ability according to Swainson was equal to his zeal, and who in trying to bring order into the vast unwieldy collection over which he was placed, fell a sacrifice to incessant labour. In trying to arrange some of the curiosities pouring in from the colonies, he described some of our land shells, and *Bulimus Dufresnii* was amongst them. I have not seen his diagnosis, but it is only of consequence now to observe that he classed the shell as a *Helix*. In 1827, when Messrs. Quoy and Gaimard visited Tasmania in the *Astrolabe*,* they met with this species and were able to make complete observations on the shell and on the animal which they characterize thus: "*Helix, testa ovata, oleaformi, imperforata, longitrorsum tenuiter striata anfractibus quinis, convexis, ultimo fasciis luteis et fuscis cincto; apertura ampla, subsemilunata, labro simplici.*"—(Shell ovate olive shaped, imperforate reddish, finely striate lengthwise, convex, whorls five, last zoned with yellow and brown bands; aperture ample, somewhat semilunar, labrum simple.)

To this description they add the following remarks: "The shell of this elegant species is of the size and shape of a little olive, solid, quite oval with a large and obtuse spire, the whorls of which are rounded, wide, the last larger than all the others together and ventricose. The aperture is rather large and a little semilunar; the peristome is simple, somewhat thick, the

* *Voyage de l'Astrolabe, Zoologie* vol. 2, p. 118; also, plate 10, fig. 1 to 3.

columella slightly twisted and white.* There is only a very faint umbilicus. The shell is finely striate lengthwise. These striae widen on the edge of the sutures where they form little irregular folds. The general color is a greenish yellow, streaked with brown encircled on the last two whorls of the spire with a little chestnut brown band, bordered by yellow lines at the two sides; a wide brown band proceeds from the summit of the peristome, turns round the columella, and is prolonged anteriorly on to the last whorl. The summit of the spire is brownish. In its young state the shell is globular, with a rounded aperture, in which the brown bands are perceptible. The animal has long posterior tentacles, while the anterior ones are of medium length. The mouth is in the midst of a muzzle of two lobes. All the upper part of the body as well as the sides are brown or almost black, shot with reddish. The foot is yellow underneath and when fully extended hardly reaches behind the shell. This *Helix* inhabits the Island of Van Dieman. It is not very common. We found it hidden under stones on the hills around Hobart Town. Some individuals were provided with an epiphragma.† Length 11 lines, thickness 5.

In Ferussac and Deshayes' *Hist. Nat. des Mollusques*, vol. 2, part 2, p. 76, we find the following synonymy and notice. Leach is referred to as above. Quoy and Gaimard, ditto. Ferussac. *Prodomus*, pl. 48, n. 330, Bowditch *Elements of Conchology*,‡ pl. 8, fig. 21, Paris, 1822. Deshayes in Lamarck, vol. 8, p. 246, no. 54. Catlow's *Conchological Nomenclator*, p. 154, no. 112. *Orthostylis Dufrenoyi* Beck Ind., p. 50, no. 9. Pfeiffer *Monograph Heliceorum vivorum*, t. 2, p. 168, no. 444, Reeve *Icon.*, plate 37, fig. 219. Habitat: Van Dieman's Land. Shell oblong oval thick and solid with a somewhat elongated spire, convex, obtuse at the summit, five flattened whorls joined by a suture bordered by a slight plaited margin. Last whorl rather large, subcylindrical convex at the base and imperforate. The aperture is of medium size, oval, dilated at the base, attenuated

* All these details show that the species would not enter into Ehrenberg's genus *Bulininus*.
† I can hardly tell what is referred to here.

‡ A very meritorious work including the animals and fossil genera: published in Paris, little known to English readers. It has become very scarce.

behind, its edge without being reflected, is not quite trenchant. It is obtuse and in profile it shows lengthwise a convex sinuosity in front. The columella is short and rather conspicuously twisted on itself. A left margin rather thick is detached and abuts on the upper end of the opening. Coarse lines of growth cover the surface, but generally they are almost effaced. The surface is marked with fine punctuations which disappear insensibly towards the base. The color of this shell is a little variable. It is of a uniform maroon brown. The last whorls bears a cincture formed of a whitish band rather broad, parted into two equal portions by a narrow and very neat brown zone. The interior is of a pale violet brown. There is a variety which is described as much smaller, narrower and subcylindrical. The large individuals are 37 millim. long, 20 wide and the variety is 29 by 13.

This description gives us an idea of how little is really gained by elaborate and minute details. From what will appear subsequently, or by consulting the plate, it will be seen how few of these particulars of color and shape are definite. The specimens referred to would be nearer fig. 4 than any other, and that is rather an exceptional form. The figures in Ferussac's Atlas are highly colored, and would not readily be recognized.

The description of Reeve is very brief. He says, "Shell cylindrically ovate, olive shaped, obtuse at the apex; whorls five to six in number minutely granulated towards the apex, crenulated along the margin; columella slightly receding, lip simple; yellowish green, banded and lineated with dark olive brown. The painting of this species is mostly represented by a conspicuous central band, with fine longitudinally waved lines above and below it." The coloring of Reeve's figure leaves much to be desired; and, in general, I think such figures are better left uncolored.

I shall now proceed to examine the variations to which the species is subject. First, as to the shape. It will be seen from fig. 1, 6, of the plate that when the shell emerges from the egg, it is obliquely sub-orbicular, and that subsequently it is generally

ovate. But the width of the oval varies considerably. In the three specimens selected from St. Leonards, near Launceston, figs. 2 a, b, and c; one (fig. 2 a,) is almost globose; 2 b, is less so, while 2 c, is lengthened oval, much more attenuated at the apex than any other except fig. 5 b, a specimen from Bothwell.* This globular habit is not due to age, for in fig. 6 a, we have a full grown form from Ringarooma, which is even still more globose and tumid. In fig. 4, a specimen from Macquarie Harbor,† we have a globose form yet again differing from the preceding, and with a very obtuse spire. I have placed three shells side by side in the plate, namely fig. 3 a, 4, and 3 b, in order to show the contrast of the variation in shape. Figs. 3 a, and b, are from Port Davey‡, and fig. 4, as already stated, from Macquarie Harbor. In figs. 7 a, b, and c, we have other specimens from Macquarie Harbor, which equally vary in size and shape. I draw attention also to the form of the apex, which is very obtuse in fig. 4, 6 a and b; moderately so in 2 a and b, 3 a, 5 a, 7 b, and almost acute in 2 c, 7 c, 5 b. The form of the aperture is equally varied; in 2 a, 5 b, 7 a and b, and 4 it is subquadrate, while in 5 b, it is narrowly pyriform, in 2 b, 3 a, and 3 b, a little wider but of the same shape. In fig. 5 a, the last whorl is produced so as to make the form oblique. The columella is also extremely variable. In 2 a, it is very much bent, contorted, and truncate, while the inner lip is reflected, giving rise to a false umbilicus. This reflexion of the lip is seen also to a smaller extent in fig. 2 b, but no trace of it remains in fig. 2 c, where the pillar is twisted almost to a plait. In figs. 3 a and b, from Port Davey, there is no perceptible reflexion of the columella. When the animal is taken fresh out of the shell, the whole of the aperture and part of the columella has a kind of silky enamel, which is quite transparent, and allows the coloring of the shell to be seen very clearly. But if the shell becomes dead, this enamel alters to an opaque chalk white, and quite conceals the color of the aperture, though it must be a lining of the most

* About 50 miles north of Hobart, and St. Leonards is about 120 miles.

† Formerly a convict station on the west coast, but now uninhabited.

‡ On the extreme south west of the island, now only occupied by a few timber sawyers and splitters.

extreme tenuity. Generally the outer lip or labrum slopes away in a smooth acute edge. In figure 4 we have an instance of a distinct sinus near the suture very like what is seen in the marine genera *Daphnella*, *Bela*, *Mangelia*, &c. This is supposed to be connected with a slit in the posterior side of the mantle of the animal. In the shell figured, probably the animal had a mantle thrown more forward in the direction of the centre of the lips, and the apparent sinus is due to the secretion of the shell being more abundant in that direction. It affords a curious instance of an abnormal character being imitative and apt to deceive collectors who rely upon a single individual. The specimen, when handled, shows the sinus in a more remarkable manner than can be expressed in a figure. The plaits or rugose edges of the whorls at the suture are not visible on the larger specimens, while on the smaller they extend down the whole length of the shells. In some shells, and generally the small ones, the surface is shining and almost polished, but in the others, especially those which are globose, the surface is silky, and under the microscope has a decussated appearance like woven cloth. In these specimens the spiral striæ are close and conspicuous, especially towards the summit.

I have mentioned already that the color varies but within certain limits, and were it not for these limits and a certain general resemblance in the pattern, I am sure many species would have been made of *Bulimus Dufrenoyi*. This general resemblance is in the permanence of one or two spiral yellow bands on the basal whorl. The body color varies from light yellow (fig. 7a), chestnut brown (fig. 6a), rich deep maroon brown (fig. 4), and dull pale olive (fig. 6b). The last whorl has generally all underneath the spiral bands of a deeper color than the rest of the shell, and when the color is yellow or olive this is a deep rich brown. When there are two yellow bands the space between has a deep brown narrow band. There seem but few exceptions to this. Sometimes there are two of the brown bands. The width of the yellow band varies in every individual and its color. I have seen a shell of a pink white

with only one deep purple brown narrow band and no other band or color. Generally the bands at each side of the darker band vary from almost dull chrome to almost white. In fact it would be difficult to imagine anything like the varied pattern which are produced by the moderate materials of brown and yellow spiral bands.

We might further enquire what are the purposes served by these bands of color. My own idea is that they are in some way connected with the organs of reproduction. I have called attention in a paper read before the Society at the last meeting to a similar feature in the *Littorinæ*. The same peculiarity is observed in many of the Australian *Bulimi*. In *B. Baconi* there are two broad conspicuous chestnut bands, though from what we have seen in *B. Dufrenoyi*, we might expect them to be one or two, or broad or narrow, according to the individual. *Bulimus Angasianus*, Pfr., has two yellow bands; but we learn from Mr. Masters, through Dr. Cox, that there is a variety at its habitat (Port Lincoln, S.A.) which is of a beautiful bright yellow color with indications of a single spiral reddish line. In *B. melo*, Quoy and Gaimard, we have another variable species with spiral lines. Dr. Cox says with reference to this shell that "it differs from *B. Kingii* in diversity of markings, conspicuously differs from it in the first instance by its greater solidity and less lengthened form. Menke specifies four varieties. Pfeiffer gives descriptions of six, and my own collection could furnish others.*" *B. Bidwilli* is another species with spiral bands. The three just named are from Western Australia, but banded forms of coloring seem to be peculiar to the South of Australia and Tasmania, and spreading westward. All the *Bulimi* found on the east side of the continent are of entirely different style of coloring.

It must be remarked that when it said that the pattern of the coloring is constant within certain limits, that is because naturalists have regarded those without any bands of color to be of different species. There is a *Bulimus* without bands in Tasmania, which

* Dr. Cox, loc. cit., p. 75.

is named *B. Tasmanicus*.* It is a good deal different in shape from *B. Dufrenoyi*, but we have seen that such a feature is not of value. It would be interesting to keep some of the live individuals for some time, and see if the different species would breed together.

The egg of the *B. Dufrenoyi* calls for no particular remark, except for its size, which is disproportionately large to the animal which brings it forth. Just before breaking forth, the shell is very thin, amber colored, and almost developed into the form figured in the plate fig. 1 b. The shell as well as the egg is so exceedingly brittle that even an alteration of the temperature is sufficient to break it, and no doubt it is in this manner that the imprisoned animal escapes from its enclosure.

In conclusion, I must express my great obligations to Mr. W. Legrand, of Hobart, author of "*Monograph of Tasmanian Land Shells*."† He placed his very extensive collections entirely at my disposal for descriptions, and I need scarcely say such a number of varieties could be got together by no ordinary observer. I have also to thank Dr. J. C. Cox, for the use of his collection.

EXPLANATION OF PLATE 7.

Fig. 1 a.—Egg of *Bulimus Dufrenoyi*.

Fig. 1 b.—Shell just emerged from the egg.

Fig. 2 a.b.c.—Specimens from St. Leonards, Launceston.

Fig. 3 a.b. do. do. Port Davey.

Fig. 4 do. do. Macquarie Harbor.

Fig. 5 a.b. do. do. Bothwell.

Fig. 6 a.b. do. do. Ringarooma.

Fig. 7 a.b.c. do. do. Macquarie Harbor.

NOTE.—All the figures are natural size.

* It is much thinner than *B. Dufrenoyi*, more acute and only found near the coast. I have very little doubt that it is identical with *B. Kingii*, Gray, of Western Australia, which has the following synonymy according to Dr. Cox. *Helix trilineata*, Q. and G., and *Ferussac*, and *Deshayes*; *B. trilineatus*, Reeve; *B. Sayi*, Pfr. Proc. Zool. Soc., 1846, p. 114; *B. mela*, Var. B. Menke Moll. Nov. Holl., p. 7. The species is found in Western Australia, but no doubt has intermediate stations.

† Printed and published by the author, 1871; and I regret to add, the first edition was small and is now out of print. Copies are exceedingly scarce.

ON THREE NEW GENERA AND ONE NEW SPECIES OF MADREPORARIA
CORALS, by the Rev. J. E. TENISON-WOODS, F.L.S., F.G.S.,
&c., &c., Hon. Corr. Mem. Linn. Soc., N. S. Wales.

The corals which I now describe I believe to be new, and are most interesting. Two are from Fiji (Nandi) and the other two are extratropical and Australian. The first belongs to the family *Turbinolidae*, sub-family *Turbinolinae*, group (probably) *Flabellaceae*. It is distinguished however in such a way from *Flabellum* proper, that in my judgment it should be made the type of a new genus. *Flabellum*, it will be remembered, is distinguished not only by its compressed calice of many septa, but also by the complete absence of pali and any trace of a columella. The septa are however often thickened and spread out on their interior edge at the base of the fossa, making what is called a pseudo columella by their contact. But though they frequently fill up the base of the fossa, yet the opposite septa do not unite. In the specimen to which I draw attention, the primary and tertiary septa which are opposite to one another do unite without any expansion or alteration beyond a slight thickening, and thus the spaces included between the primaries and secondaries become complete compartments, extending continuously from one side of the calice to the other. The form of the calice also is certainly not flabellate. It is broadly elliptical, and narrowed very little below until it suddenly rounds off to a small pedicel. The peculiar ornamentation of the base, and the general contour forcibly remind one of an urn or ornamental vase. The affinities of the genus are probably more with *Sphenotrochus* than *Flabellum*, and if the specimen were in a little better state of preservation, one could speak more positively as to the epitheca and the edge of the calice. From the general aspect of the corallum, I propose for the genus the name of *Vasillum*. The following is the diagnosis:—

VASILLUM. New genus.

Corallum generally resembling *Sphenotrochus*, but in place of a columella the septa of opposite sides of the calice unite to form separate compartments.

VASILLUM TUBERCLATUM, N. S., Pl. 10, figs. 3, 3a, 3b.

Corallum urn shaped, attached by a rather small cylindrical pedicel; apparently no epitheca;* the costæ broad and flat, divided by slight grooves which correspond with the primary and secondary septa; at the base of the ribs, but not at the base of every one, there is a blunt, prominent and conspicuous tubercle, symmetrically placed, so that there is one at each end and two at each side (six in all, corresponding to the systems) of the major axis; calice broadly elliptical and rather everted; ends of major axis somewhat lower, from which the edge curves upwards to the minor axis in a zigzag line; angles of zigzag very obtuse; the apices corresponding with the primary and secondary septa, and therefore with the grooves between the costæ; fossa shallow except at the centre where there is a deep groove; septa in six systems of four cycles, but the third and fourth, though always present are merely rudimentary; primaries and secondaries equal, salient, but not exsert, thickened at their point of union; the primaries at the end of the major axis of the calice do not unite with the secondaries which meet in front of them; all highly granular. Alt. 10, major axis $9\frac{1}{4}$, minor 7, mil. Port Phillip or Bass Straits. The specimen was forwarded to me by Prof. McCoy, from examples in the Melbourne National Museum.

I may mention further that when the base of the fossa is examined by a lens and with a good light, there is a kind of calcareous deposit in the centre underneath where the septa unite, and at the end of the major axis, one of the secondaries sends forth a process to unite with a primary. I should say that the individual was not very young even though the third and fourth cycles are so rudimentary. It has many analogies with a fossil described by me from the Muddy Creek beds, in *Proc. Roy. Soc. N. S. Wales*, vol. 9, (1877), p. 189, and named *Placotrochus elegans*. I think also there is a fossil found still more nearly allied, but which has not been described, nor is it just now accessible to me for comparison. Its form was similar though smaller, and as far as I remember it would belong to the same genus.

* The specimen is rather worn, and the details of the epitheca, costæ, &c., could not be well made out.

The new coral to which I have now to draw attention is a very remarkable instance of the appearance in the present epoch of characters which belong to long-extinct forms of life, united to others which are our commonest forms of zoophytic life. Most geologists are familiar with a certain fossil coral which goes by the name of *Microsolena*. It is a zoothome of a dense tissue with rather deep calices, without pali or distinct walls, with confluent septa very much perforated or trabecular, and the whole mass of the calices surrounded by a strongly marked epitheca. The most marked feature amongst them is their confluent calices, which renders it difficult to distinguish them from *Thamnastrea* and *Oroseris* when they are not in a good state of preservation. They are all lower Mesozoic fossils, the most of them having been found in the Upper Jura of France, or in the Great Oolite of England. Lamouroux (*Exposition methodique des genres de l'ordre Polypiers*, Caen 1821, p. 65,) and subsequently Blainville (*Manuel d'actinologie*, 1834, p. 423), regarded the fossil which served as the type of the genus, as near to the *Tubulipora*, (which are Polyzos,) because they mistook the trabecular portions of the septa as tubes which had been filled up by a process which was then supposed to happen in the case of *Oeriopora*. Mons. H. Michelin (*Iconographie Zoophytologique. Description des polypiers fossiles de France et des pays environnants fig. par L. Michelin and J. Delarue*, 1841-1847, p. 227, 1845) was the first to recognize the true character of these corals, but he mistook the genus and named them *Alveopora*. In reality says Milne Edwards (*Hist. Nat. des Corallaires vol. 3*, 1860, p. 196,) the genus *Microsolena* differs very little from *Coscinaerea*, and is only distinguished by the lax tissue, the complete epitheca, and the more scattered trabecular septa.

The genus *Microsolena* belongs to the second family of MADREPORARIA PERFORATA, the PORITIDÆ, a division which is characterized by the reticulate, trabecular and porous *sclerenchyma*; the individuals always closely united together either directly by thin walls or by the insertion of a spongy *cœnenchyma*; they increase by gemmation which is ordinarily extracalicular and submarginal.

The septal apparel is always more or less distinct, never completely lamellar, and formed only by a series of trabecules, which constitute by their union a sort of loose and irregular trellis-work. The walls present the same porous and irregular structure. The visceral chambers contain at times certain rudimentary traverses, but are never divided by floors* (*planchers*).

This family of PORITIDÆ is divided into two groups. 1. PORITINÆ = no *canenchyma*; 2. MONTIPORINÆ = *canenchyma*, well developed; and it is among the 1st. group that the *Microsolena* are found. This group contains nine genera; the first two (*Porites* and *Rhodaræa*) distinguished by pali, and the other seven (*Goniopora*, *Litharæa*, *Protaræa*, *Alveopora*, *Meandaræa*, *Oosinaræa*.) destitute of those organs.

As already stated, *Microsolena* is distinguished by having all the individuals enclosed in a strong or compact epitheca, and the septal apparatus confluent. The zoothome thus resulting is massive, turbinate, gibbous, digitiform, dendroid or spread out in plates. There are about twenty fossil species known, and they appear as late as the later mesozoic rocks.

The coral which I am about to describe is a *Microsolena*, in which the septa are not confluent. It would belong to the turbinate division, but must be placed in a genus by itself, for the septa are not only trabecular irregular and distinct, but the gemmation is most peculiar, being intracalicular and in congeries of individuals, rising one above another. The walls are also entire above, and form more or less complete partitions above with none of that open spongy tissue which occurs in *Alveopora*, neither could I see any of those horizontal partitions across the cells, which gives to the genus just named that tabulate character of the ancient *Favosites*.† From these peculiarities of the walls, septa, and mode of gemmation, I propose the erection of a new genus, to which I give the name *Diechoræa* (from *διεχω* to stand apart in allusion to the non-confluent septa). The genus is thus characterized:—

* Hist. Nat. des Cor., Vol. 2, p. 172.

† On account of this tabulate structure, a related species of unknown locality has been made the type of new genus called *Favositipora* by Mr. W. S. Kent (see Ann. Nat. Hist., 1870), but Mr. Dana had already called attention to the structure.

DIECHORÆA. New Genus.

Poritinae with the individuals enclosed in a common and conspicuous epitheca like *Microsolena*, but with the septa not confluent, apart and trabecular; gemmation intracalicular.

DIECHORÆA BOLETIFORMIS, N. S., Pl. 10, fig. 4, magnified
4 diam. fig. 4a, calice, magnif. 6 dia.

Corallum small, turbinate, elliptical, spreading rapidly into a broadly flaring undulating disc. Peduncle wide, but not so wide as the summit.* Calices numerous, polygonal, irregular in shape and size, and all very minute, but some so much longer than others that they appear to result almost from the confluence of two. Septa, an irregular series of sharp needle-like points of every length, sometimes almost stretching from side to side, and making the interior of the very deep fossa bristle with their transparent projections; wall thickly studded with short stout and very conical points, swollen at the base and always pointing towards the interior of the fossa. Epitheca in very thick folds of yellowish, shining, fibrous-like tissue completely covering the exterior and projecting as a thin lamina above the edge. Inside this there are, in the only specimen I have seen, other raised rings of epitheca enclosing a number of calices, but only very slightly (half a millimeter) above the parent. This raised ring enclosed another circle, also slightly raised, but in this circle the calices appear incomplete, for they are closed completely across by a kind of transparent membrane, on which a few spiculæ like septa are lying, and the walls are more roughly granular. The whole calicular surface is convex, broadly elliptical, the ends of the major axis being depressed. The appearance is very like a small dry *Boletus* such as grow upon dry or withered branches. Alt. 7, major axis 7, min. 6, mill. Taken from the side of a dead coral on a reef off Nandi, Fiji Group.

We may suppose in this very interesting species that the real septa upon which the animal rests are the granular points on the summit of the wall, and that the spiculæ or pseudo septa in the

* The specimen was broadly attached to a coral, and it seems as if in breaking it off, some of the points of attachment had been broken as well.

fossa are the supports for the base of the animal. The calices themselves are quite microscopic, three or four of them occupying no more than the space of a millimeter.

I now have further to introduce to science a very interesting coral of the tabulate section of *Madreporaria* (*MADREPORARIA TABULATA*). In the third family, the *SERIATOPORIDÆ*, we have arborescent corals with an abundant and compact *cænenchyma*, few traces of tabulæ, and the visceral chamber filling by the continuous growth of the walls and columella. The family is divided into four genera, the first, *Seriatopora*, remarkable for the hispid surface and the almost complete absence of septa. They are all nearly very small corals with exceedingly minute calices. The septa are more visible in the next genus, *Rhabdopora*, which is a Paleozoic (carboniferous) fossil with prismatic branches. *Dendropora* has the calices scattered, with a raised margin and a smooth *cænenchyma*. This is also a Paleozoic fossil as well as the next genus, *Trachypora*, which has the *cænenchyma* striate.

The species I propose to describe does not come under any of the foregoing genera, but appears to occupy an intermediate place and nearest to *Seriatopora*. It has thin cylindrical branches, very hispid, with scattered calices and exsert septa. I propose from the latter character to name the genus *Phyllopora*, which is thus described :—

PHYLLOPORA. New genus.

Cænenchyma, hispid, compact; tabulæ, rarely visible; calices, distant; septa, exsert, distinct, and in cycles.

PHYLLOPORA SPINOSA, N. S., Pl. 10, fig. 2, 2a.

Corallum very small, tufted, much branched; *branches* generally at right angles or sloping upwards, and bifurcating; surface very granular, the granules supporting long, fine, branched, and subdivided projections; *calices* in a linear, rather distant, projecting series; *systems* six, *cycles*, two always present with the rudiments of a third; *septa* hispid, exsert; primaries projecting into the calice; secondaries and tertiaries smaller,

and lying upon the margin; *columella* styliform, prominent, central. *Dimensions*: tufts 20 to 25 millim. high, diam. of branches 1 to 2.

There are about 32 calices in about 10 millim. of a branch, arranged in four lines on opposite sides and alternately, so that the series is quincuncial.

From a block of dead coral from Fiji. One very small tuft. Museum of Hon. W. Macleay.

Section *Madreporaria perforata*. Family *Madreporidae*, subfamily *Eupsamminae*.

BALANOPHYLLIA DENTATA, n. s., Pl. 10, fig. 1, 1a.

Corallum, moderately tall, very slightly spreading towards the calice which is broadly elliptical, very deep, and with a thick honeycombed margin, upon which the groups of three septa project to form a regularly coronate edge; calicular fossa wide and deep, septa subequal projecting very little from the wall, and therefore only slightly salient into the fossa, all highly granular, and with regularly dentate edges, the teeth on the third, fourth, and fifth orders being long and neat near the margin, becoming coarse tubercular and granular near the *columella*; four cycles in six systems; primaries thick and secondaries nearly equal to them; fourth and fifth orders uniting in front of the tertiaries close to the wall, the same orders closely adpressed to the primaries and secondaries at their origin and projecting above the edge of the calice; *columella*, loose, spongy, small and inconspicuous; *costae*, distinct, broad, flat, very finely granular; no epitheca visible.

The only specimen seen by me is so encrusted with *Polyzoa*, as to make the epitheca doubtful. As however this organ is a mere secretion for the protection of the coral, this function no doubt was effected by the *Polyzoa*. The coral itself was parasitic upon an *Eschara* from the South Coast, which is probably *lichenoides*, M. Ed. I am not sure of the locality, but as the *Polyzoa* are known to me as from the South Coast, the coral must have come from the same locality. Amongst them was what I take to be D'Orbigny's *Discoporella Novae Hollandiae*, which

has not been identified since the author's description as far as I can learn. The coral itself was completely embedded in the foliations of the *Eschara* which had to be broken away in order to extract it. It is 14 millim high, major axis of calice 9, minor 7.

In the depth of the fossa, smallness of columella, granular septa and absence of epitheca, this species comes nearest to the tertiary fossil from Muddy Creek *B. tubuliformis*, Duncan, but in that species the higher orders do not unite.

I am not aware whether any other instances are known of corals growing on tufts of Polyzoa, but as this has been found, collectors will probably make a more diligent search, as the specimen of *Eschara* has been a long time in the Macleayan Museum, and had been many times handled by me before the existence of the *Balanophyllia* was observed. The *Eschara* in question grows on rocks and stones in comparatively shallow water, and the growth is very rapid. A specimen grew to a tuft about 6 inches high, and spread about 9 inches in every direction on the anchor chain of a vessel that was exactly three months in harbor.

EXPLANATION OF PLATE 10.

Fig. 1.—*Balanophyllia dentata*, slightly enlarged.

Fig. 1a.— ditto ditto calice

Fig. 2.—*Phyllopora spinosa*, nat. size.

Fig. 2a.— ditto ditto part of branch magnified.

Fig. 3.—*Vasillum tuberculatum*, slightly enlarged.

Fig. 3a.— ditto ditto calice.

Fig. 3b.— ditto ditto base.

Fig. 4.—*Diechorea boletiformis*, enlarged 4 diameters.

Fig. 4a.— ditto ditto calice.

ZOOLOGY OF THE "CHEVERT."

ORNITHOLOGY. PART II.

By E. P. RAMSAY, F.L.S., &c., &c.

HAVING been requested by Mr. Macleay to examine and determine the beautiful collection of Birds obtained in New Guinea during the voyage of the "Chevert," I have much pleasure in laying before the meeting this evening a list of the species, with a few remarks on some of those which appear to me to be of interest.

I find among the *Paradietidae* two species of Manucodes, one Bower bird (*Ohlamyododera*) and one species of *Paradisea* (*P. raggiana*). The *Columbæ* are particularly well represented by thirteen species, four of which are Australian. One of the most interesting is a spirit specimen which I have, with some doubt, assigned to *Hemicophaps albifrons*, of G. R. Gray.

The *Psittacidae* contain a fine series of carefully sexed specimens of *Isleetus polychlorus*, two species of White Cockatoos, beautiful skins of *Geoffroyus aruensis*, *Chalcopsittacus scintillatus*, and a fine specimen of *Lorius hypoenochrous*, G. R. Gray, with the interscapular region black. Some fine specimens of *Todopsis cyanocephala* (Quoy et Gaim ?) * males and females; the latter sex I believe has been described under the name of *Todopsis bonapartei* by Dr. G. R. Gray. The *Muscicapidae* are represented by seven species, including beautifully prepared skins of *Peizorhynchus* (*Drymophylla*) *alecto*, Temm., (the *P. nitidus* of Mr. Gould,) and *Arses enado*, Less., usually known under the name of *Arses telescopthalmus*, Less., which is the male of the species.

Among the *Camphephagidae* I find *Graucalus angustifrons* (of R. B. Sharpe), a species closely allied to the Australian *Graucalus hypoleucos*, Gould, best distinguished by its whiter forehead and jet black frontal band; *Edolisoma boyeri*, Quoy et Gaim., and *E. melas*, S. Mull; also the female and a species of *Camphephaga*, slightly different from *C. jardinii*, which is probably *C. mülleri*, of Salvadori (*Ann. Mus. civ. nat. Genov.*, VII, p. 927; 1875).

* I can find no difference between the Port Moresby birds and those from the Aru Islands. The females of both agree with the figure in the Voy. de l'Astrolabe, pl. 5, fig. 4.

The *Meliphagide* are represented by six species, which include *Myzomela erythrocephala*, Gould; and *Ptilotis analoga*, Reich., which I find varies much in size.

One species of *Dicaeum* was obtained, the beautiful *Dicaeum rubrocoronatum* of Mr. R. B. Sharpe.

Among the Plovers are *Charadrius mongolicus*, of Pallas, and *Himantopus leucocephalus*, and among the *Anatides*, *Anas castanea* of Eyton, the *A. punctata* of Mr. Gould's Birds of Australia.

The whole collection contained about 400 specimens representing 53 genera and 68 species, all of which have been carefully sexed and the localities noted by Mr. G. Masters, Curator of the Macleayan Museum, who accompanied the expedition.

I must acknowledge valuable assistance obtained from Count Salvadori's numerous papers on *Papuan Ornithology*, (*Ann. Mus. Civic. Genov.*) which the learned author has so kindly forwarded to me, and also from Mr. R. B. Sharpe's valued "*Contributions to the Ornithology of New Guinea*," *Journ. Linn. Soc. Zool.* vol. XIII. I regret I have not yet seen Sharpe's Cat. Birds, Vol. III.

Family PARADISEIDÆ.

1.—PARADISEA RAGGIANA, *Sclater*.

Paradisea raggiana, *Sclater*, *P. Z. S.* 1873, p. 559.

Two specimens in spirits, adult ♂, ♀.

Loc. Adjacent coast, opposite Yule Island, on the Ethel River.

2.—MANUCODIA ATRA, *Less.*

Less. Voy. Océ. Zool. I, pt. 2, p. 638. (1828). *Salvad. op. cit.* IX, p. 189; *Sharpe, op. cit.* XIII, pp. 317 and 500.

The collection contains a fine series of beautifully preserved specimens of this fine species. The trachea is simple, not convoluted as in *M. gouldii*, from Cape York. The young are destitute of the beautiful purple reflections so conspicuous in the adults and have not the recurved feathers on the head.

This appears to be very common all along the south coast; it is the most common of Port Moresby species.

Loc. Hall Sound, Katan (Masters); Port Moresby (Morton, Broadbent).

3.—*MANUCODIA KERAUDRENI*, *Less & Garn.*

Voy. Coq. pl. 13.

The trachea of this species is convoluted as in the Australian species, to which it is very closely allied. It is a rare bird on the south coast of New Guinea.

Loc. Hall Sound.

4.—*CHLAMYDODERA CERVINIVENTRIS*, *Gould.*

Gould, P. Z. S. 1050, p. 201; *id. Bds. of Aust., fol. Supp. pt.* —, *pl.* —; *id. Handbk. I.*, p. 445; *Ramsay, List. Aust. Bds. sp.* 312.

Several specimens in no way differing from the Cape York examples. A bower was obtained by Mr. Masters among the Mangroves on the margin of a scrub within the influence of Spring tides.

Loc. Hall Sound.

Family CINNYRIDÆ.

5.—*CINNYRIS FRENATA*, *S. Mull.*

Shelly, Mon. Cinn. pt. III; *Gould, Bds. Aust. Supp. I.*, *pl.* 45; *id. Handbk. Bds. Aust. I.*, p. 584; *Ramsay, List. Aust. Bds. p.* 191; *sp.* 403.

Common on the South coast of New Guinea and on all the wooded islands in Torres Straits.

Loc. Hall Sound, &c.

COLUMBÆ.

Family CARPOPHAGIDÆ.

7.—*CARPOPHAGA PINION*, *Quoy and Gaim.*

Q. & G. Voy. Uran. Zool. p. 118, *pl.* 28 (1824); *Sharpe, Journ. Linn. Soc. Zool. XIII. p.* 319; *id. t. c. p.*, 502; *Salvad. Ann. Mus. Civic. Genov. IX. p.* 202, *sp.* 52.

Tolerably common on South Coast.

Loc. Hall Sound.

8.—*CARPOPHAGA MULLERI*, *Temm.*

Pl. col. 556. (1835); *Salvad. Ann. Mus. Civic. Gen. IX. p.* 402, *sp.* 51.

Several specimens of this fine species.

Loc. Hall Sound.

9.—*CARPOPHAGA SPILOBRHOA*, *G. R. Gray*.

G. R. Gray, *P. Z. S.*, 1858, p. 186; *Ramsay*, *P. L. S.*, *N. S. W.*, vol. I. p. p. 372, 394; *id. t. c. II.* p. 195, 372-3-4; *id. t. c.* 1876, p. 115; *Gould*, *Handbk Bds. Aust. II.* p. 144; *Salvad. t. c. IX.* p. 202, sp. 55.

Common everywhere on the South Coast, and all the wooded Islands of Torres Straits.

Loc. Hall Sound, Katau, Yule Island, &c.

10.—*MEGALOPREPIA PUELLA*, *Less.*

Less. Bull. Univ. Sc. nat. X. p. 400. (1827); *Salvad. t. c. IX.* p. 193.

This species is closely allied to *M. assimilis* *Gould*, of which I have seen specimens differing but little in size, from Cape York.

Loc. Katau.

11.—*PTILOPUS SUPERBUS*, *Temm.*

Temm. Knip. Fig. P. 75, pl. 33. (1108-11); *Salvad. t. c.* p. 199; *Gould. Bds. Aust. Handbk. II.* p. 108.

Several fine specimens, males, females, and young.

Loc. Hall Sound.

12.—*PTILOPUS CORONULATUS*, *G. R. Gray*.

G. R. Gray, *P. Z. S.* 1858, p. 185. pl. 138; *Sharpe t. c.* pp. 320, 503; *Salvad. t. c.* p. 190.

Two specimens. This species was not found to be common.

Hoc. Hall Sound, Ethel River.

13.—*PTILOPUS AURANTII FRONS*, *G. R. Gray*.

G. R. Gray, *P. Z. S.*, 1858, p. 185. pl. 137; *Salvad. t. c.* p. 197.

Tolerably plentiful all along the South Coast.

Loc. Ethel River, Hall Sound.

14.—*PTILOPUS IONONOUS*, *G. R. Gray*.

G. R. Gray, *P. Z. S.* 1858, p. 186; *Salvad. t. c.* p. 198.

Loc. Hall Sound, Katau.

Family COLUMBIDÆ.

15.—*MACROPTYGIA DOREYA*, *Bp.*

Bp. Consp. Av. I., p. 517, (1854).

One specimen which I believe is referable to this species, it is closely allied to *M. phasianella* of New South Wales.

Loc. Katan.

16.—*GROPELIA FLACIDA*, Gould.

Handbk. Bds. Aust. II. p. 145.

Apparently the same as the Cape York individuals, tolerably common.

Loc. Hall Sound.

Family GOURIDÆ.

17.—*CHALCOOPHAPS CHRYSOCHLORA*, Wagl.

Wagl. Syst. Av. Columba, sp. 79, (1827); Gould. Bds. Aust. fol. vol. V. pl. 62; id. Handbk. II. p. 118.

Loc. Hall Sound.

18.—*HENICOPHAPS ALBIFRONS*, G. R. Gray.

G. R. Gray, P. Z. S. 1867, p. 432., pl. 47; Salvadori, t. c., p. 207.

One specimen in spirits.

Loc. Hall Sound.

19.—*GOURA ALBERTISI*, Salvad.

Salvad. Atti. R. Ac. Sc. Tor. XI., p. 680, t. VII. (1876).

This fine species appears to be very plentiful all along the South Coast of New Guinea, where during the drought of 1877-8, they appeared in great numbers.

Loc. Hall Sound, Ethel River, &c.

Order PSITTACI.

Family PSITTACIDÆ.

20.—*CACATUA TRITON*, Temm.

Temm. Coup d'œil les possess. Néerland dans l'Inde Arch. Tom. III. (1849)., p. 405. (Nota); Finsch. Papag. I. p. 291; Salvad. t. c., p. 24.

Mr. Masters informs me this species was found tolerably plentiful, and feeding on the green cocoanuts. Specimens were brought alive to Sydney.

Loc. Hall Sound.

21.—*CACATUA GALERITA*, Lath.

Lath. Ind. Orn., p. 109, 1790.

Undoubted specimens of this species were obtained by Mr. Masters, who notices that the crests are slightly longer in proportion to the size of the bird than in the N.S. Wales individuals. The natives keep both species for the sake of the yellow crest-feathers, which they pluck out for ornamenting their heads, &c.

Loc. Hall Sound, Katan.

22.—*MICROGLOSSUS ATERRIMUS*, Gm.

Gm. Syst. Nat. I., p. 380, n. 93, (1788) ; *Sharpe, Journ. Linn. Soc. Zool. XIII.*, p. 491 ; *Salvad. Ann. Nat. Mus. Civic. Gen. X.*, p. 25.

I find this a very variable species as to size, some, apparently adult birds, are much smaller than others from the same locality, this and a slight difference in the contour of the bill and elongation of the crest feathers led me to believe that there were two distinct varieties, if not species*—*M. aterrimus* and *M. goliath*. I have every reason to believe now that the differences are merely individual.

Loc. Hall Sound.

23.—*GROFFROYIUS ABEUENSIS*, G. R. Gray.

G. R. Gray, P. Z. S., 1858, p. 183 ; *Sharpe, op. cit.*, 1878, p. 309 ; *Salvad. Ann. Mus. Civic. Genov. X.* p. 29 ; *id.*, *op. cit. IX.* p. 810.

Fine adult specimens of this beautiful species were obtained.

Loc. Hall Sound, Katan.

24.—*ECLECTUS POLYCHLORUS*, Scop.

Scop. Del. Flor. and Faun. Insubr. p. 87, n. 27, (1786) ; *Salvad. op. cit. IX.*, p. 31 ; *id. Sharpe op. cit. XIII.*, p. 491 ; *Ramsay, Ibis 4th, Ser. II.* p. 379.

A fine series of adults, male and female, carefully sexed by Mr. George Masters. The red and blue birds are undoubtedly females, and the green birds males. Mr. Alex. Morton, who has lately returned from New Guinea, informs me that the same distinction

* See List of Aust. Birds, *P. Z. S., N. S. W.*, II., p. 198, also, *op. cit. I.*, p. 394.

holds good with the *nestlings*—females and males, which are red and green respectively. Mr. Masters informs me the adult birds are frequently found feeding on the young cocoanuts (*cocos nucifera*).

Family TRICHOGLOSSINÆ.

25.—*LOBIUS HYPENOCHROUS*, G. B. Gray.

List Psitt. Brit. Mus., p. 49, (1859).

LOBIUS HYPENOCHROUS, Var. *Gulielmi*.

Ramsay, P. L. S., N. S. W., vol. III., p. 73.

A very fine specimen which I refer to this species has a distinct black band across the mantle and interscapular region, and the centre of the abdomen black, the under tail-coverts blackish violet. Specimens referable to the same species from the Duke of York Islands have no black on the upper surface, and the abdomen of a duller, lighter, and more indistinct tint of reddish violet, just as figured in the plate in the "Voyage of the Curaçoa."

Loc. Katan.

Family CARPOPHAGIDÆ.

26.—*CHALCOPSITTACUS SCINTILLANS*, Temm.

Temm. pl. col. 569 (*juv.*) 1835; *Salvad. Ann. Mus. Civic. Genov.* X. p. 34.

Found to be plentiful, but no specimens were obtained of the smaller species so common at Port Moresby, *C. chloropterus* of Salvadori, and of which I have lately examined a very large number, the *young only* of *C. chloropterus* have the under wing-coverts all green, the adults have crimson foreheads like *C. rubrifrons* (G. B. Gray), and *always more or less crimson on under wing-coverts*. They are slightly smaller than Aru Island examples, which I believe to be *C. rubrifrons* of Gray. The present species, *C. scintillans*, is altogether distinct from *C. chloropterus* (Salvadori) being a much larger bird. I regret I have not a larger series of the Aru Island birds to compare them with, but I do not think there can be any doubt of there being two distinct species on the South Coast of New Guinea.

Loc. Hall Sound, Katan, &c.

27.—*TRICHOGLOSSUS MASSENÆ*, Bp.

Bp. Rev. et Mag. de Zool. 1854, p. 157; *Finsch die Papag. II.*, p. 834; *Salvad. Ann. Mus. Civic. Genov. X.* p. 35.

Several specimens obtained, varying slightly in the tint of the red colouring of the under surface.

Loc. Hall Sound, Katan.

Order PASSERES.

Family STURNIDÆ.

28.—*CALORNIS METALLICA*, Temm.

Ramsay P. L. S. 18, p.—; *Gould Handbk. Bds. Aust. vol. I.*, p. 477; *C. viridescens*, *G. R. Gray*; *Sharpe Journ. Linn. Soc. Zool. XIII.*, p. 318.

These specimens are undoubtedly the same as the Cape York birds and identical also with those from Rockingham Bay and the long tailed species from Port Moresby, but whether it be the true *metallica* or not, I must leave to those who have an opportunity of examining the types to decide. Mr. Sharpe remarks (op. cit. p. 318) that "the Yule Island bird agrees better with *C. viridescens*, with a Dorey specimen of which I have compared it, and it agrees with the latter in wanting the purple shade upon the flank, so conspicuous in the true *C. metallica*." I have examined some hundreds of specimens from Rockingham Bay, Cairns, Cooktown, Cape York, Yule Island, Hall Sound, Katan, and Port Moresby, without finding any difference between any of them.

Like the Australian examples, they breed together in hundreds, constructing their flask-shaped nests together in clumps, occupying whole trees of immense size. I have myself counted over 300 nests on one tree in Australia. Mr. Masters informs me that on one large tree on Yule Island, the mass of nests completely covered and bore down the branches, and must have weighed over twenty tons.

Loc. Yule Island, Hall Sound, Katan.

29.—*EULABES DUMONTII*, Less.

Sharpe, Journ. Linn. Soc. Zool. XIII., p. 378; p. 501; *Gracula damontii*, *Ramsay, P. L. S., N. S. W.*, vol. 1, p. 392.

Common everywhere. A noisy and pugnacious species.

Loc. Hall Sound, Katau, Yule Island.

Family MALURIDÆ

30.—MALURUS ALBOSCAPULATUS, *Meyer.*

Sharpe, op. cit. XII. p. 315 ; id. t. c., 494.

Several specimens obtained. This species is common at Port Moresby. The young have the wings brown, the sexes alike in plumage.

Loc. Ethel River, Hall Sound.

31.—TODOPSIS CYANOCEPHALA, *Quoy et Gaim.*

Todopsis bonapartii, G. R. W., Sharpe op. cit. XII. p. 498.

In the first place I know many ornithologists will not agree with me in placing this bird among the *Maluridæ*. However, from a knowledge of its habits and actions, and after an examination of several spirit specimens, I am fully convinced I am right in keeping it close to the genus *Malurus*. Now as to the species—I have examined fifteen specimens in all from various parts of the South Coast of New Guinea, and compared them with the Aru Island birds, without finding any material difference. One of the specimens, an *adult male*, in the Macleayan Museum, has small white tips to the tail feathers. I have compared them also with the figures and descriptions in the *Voy. au Pôle Sud.*, *Voy. de l'Astrolabe*, and in the Proceedings of the Zoological Society of London, 1858, and to me they appear to be identical. Mr. R. B. Sharpe, however, one of our best authorities, states (*op. cit.*) of the Port Moresby birds, *that they certainly are not, C. cyanocephala*, and his opinion should have weight in the matter. But I am still of opinion that they are all one and the same species which should bear Lesson's name of *T. cyanocephala*.

Loc. Hall Sound.

32.—CISTICOLA RUFICEPS, *Gould.*

Gould. Bds. Aus. fol. vol. III. pl. 45 ; id. Handbk. I. p. 353 ; Ramsay, P. L. S., N. S. W., vol. II., p. 185, sp. 233.

These specimens are undoubtedly the same as the Australian individuals described under this name by Mr. Gould.

Loc. Yule Island, Hall Sound.

Family PITTIDÆ.

33.—PITTA NOVE-GUINÆ, *Mull. & Schleg.*

Sharpe op. cit. XIII., pp. 315 and 494.

Several fine specimens of this beautiful species, which is found tolerably common in all the damp scrubs along the coast during certain seasons of the year.

Loc. Hall Sound, on the banks of the Ethel River.

Family LANIIDÆ.

34.—CRATICUS CASSIUS, *Bodd.*

Sharpe, t. c. pp. 317, 499.

This appears to be the most common species of the genus found on the South Coast; I have received two other species from Port Moresby.

Loc. Hall Sound, &c.

Family DICRURIDÆ.

35.—CHIBIA CARBONARIA, *S. Mull.*

Sharpe, Cat. B. III., p. 239; Journ. Linn. Soc. Zool. XIII., p. 499; Dicrurus carbonarius, S. Mull, Salvad. & A. D'Albert Ann. Mus. Civic. Genov. VII., p. 821, (1875); Ramsay, P. L. S., N. S. W., vol. I., p. 392.

Very common all along the South Coast.

Loc. Hall Sound, Katan, &c..

Family ARTAMIDÆ.

36.—ARTAMUS LEUCOPTYCHALIS, *Gould.*

Gould, Handbk. Bds. Aust. p. 154; id. P. Z. S., 1842, p. 17; Ramsay, P. L. S., N. S. W., vol. II., p. 179.

The New Guinea specimens are slightly smaller than those from N. S. Wales.

Loc. Katan.

Family CUCULIDÆ.

37.—CENTROPUS SEILOPTERUS, Gray.

Sharpe, t. c. pp. 81, 370, 491; O. melanurus, Ramsay, P. L. S., N. S. W., vol. I., p. 394.

Common in all the grass beds.

Loc. Hall Sound, Katan, Yule Island.

38.—SCYTHEROPS NOVE-HOLLANDIÆ, Lath.

Salvad. and D'Albert, Ann. Mus. Civic. Genov. VII., p. 815; Ramsay, t. c. p. 394.

Common, similar to the Australian birds.

Loc. Katan.

39.—CHALCITES PLAGOSUS, Lath.

Gould. Handbk. Bds. Aust., vol. I, p. 623; Ramsay, op. cit. vol. II., p. 192.

Precisely the same as the North Australian birds of this species.

Loc. Hall Sound.

Family DICÆIDÆ.

40.—DICEUM RUBROCORONATUM, Sharpe.

Sharpe, Nature, Aug. 17, 1876, p. 339., Salvad. Ann. Mus. Civic. Genov. IX., p. 81; Ramsay, op. cit. vol. I., p. 390; Sharpe, Journ. Linn. Soc. Zool. XIII., p. 496.

This beautiful species was first discovered by Mr. Masters, during the Macleay Expedition, and afterwards obtained by Messrs. Broadbent and Petterd, Goldie, Morton, and others. I find that it is tolerably common all along the South Coast, particularly at Port Moresby, on the Lalokie River, where the types were obtained by Broadbent.

Loc. Hall Sound.

Family MELIPHAGIDÆ.

41.—MYZOMELA OBSCURA, Gould.

Gould, P. Z. S., vol. X. p. 136; Sharpe, Journ. Linn. Soc. Zool. XII. p. p. 496; Salvad. Ann. Mus. Civic. Genov. IX. p. 32 Ramsay, P. L. S., N. S. W., II. p. 190.

Generally dispersed over the South Coast.

Loc. Katan, Hall Sound.

42.—*MYZOMBLA ERYTHROCEPHALA*, Gould.

Gould, *P. Z. S.*, pt. VII. p. 144; *id. Handbk. Bds. Aust. I. p.* 556; *id. Bds. Aust. fol. vol. IV. pl.* 64.

I believe this is the first time this species has been recorded from New Guinea. I find no difference between the New Guinea examples and those from the Australian Coast.

Loc. Katau, Hall Sound, &c.

43.—*PTILOTIS ANALOGA*, Reichenb.

Salvad. Ann. Mus. Civic. Genov. IX., p. 32; *P. gracilis*, Gould, *P. Z. S.*, 1866, p. 217; *P. notata*, *id. Supp. Bds. Aust. fol. vol. I. p.* 41; *Ramsay, P. L. S., N. S. W., II. p.* 207; *P. similis. Homb. et Jacq Voy. au Pôle Sud. pl. XVII. fig.* 23.

Evidently a very common species, distributed over the whole of the Southern part of New Guinea, and the North and North-Eastern shores of Australia.

Loc. Hall Sound, Katau, &c.

44.—*PTILOTIS VERSICOLOR*, Gould.

Gould, *Bds. Aust. fol. vol. V. pl.* 34; *id. Handbk. Bds. Aust. I. p.* 506; *Ramsay, P. Z. S., N. S. W., II.*, p. 189; *Ramsay, op. cit. II. p.* 189.

At present this is the only instance or record of undoubted specimens of this beautiful species being found in New Guinea. They differ in no way from the Australian birds.

Loc. Katau.

45.—*PTILOTIS FILIGERA*, Gould.

Gould, *Bds. Aust. Supp. fol. vol. I.*, p. —; *id. Handbk. Bds. Aus. I.*, p. 522; *Ramsay, List of Australian Birds, P. L. S., N. S. W., II. p.* 189; *Salvad. Ann. Mus. Civic. Gen. IX.*, p. 33.

Generally dispersed, but not plentifully, over the whole of the South Coast.

Loc. Hall Sound.

46.—*TROPIDORHYNCHUS NOVÆ-GUINÆÆ*, S. Mull.

S. Mull, Vehr. Nat. Gesch. p. 153; *Salvad. & D'Alb. op. cit. VII. p.* 826; *Salvad. op. cit. IX.*, p. 34; *Sharpe. op. cit. XIII.*, p. 497; *Philemon novæ-guinææ, Ramsay, op. cit. I. p.* 390.

Very plentiful everywhere.

Loc. Hall Sound, Katau, &c.

Family CRATEROPODIDÆ.

47.—POMATOSTOMUS ISIDORII, Less.

Less. Voy. Ooq. Atlas. pl. 29. fig. 2; Salvad. op. cit. VII. p. 825; Ramsay, op. cit. II. p. 391.

This species was not found plentiful, its habits and actions resemble those of the Australian species. Mr. Masters informs me they traverse the woods in small troops, and frequent the more open parts, and being always on the move are not easily obtained.

Loc. Hall Sound.

Family ORIOLIDÆ.

48.—ORIOLUS STRIATUS, Quoy et Gaim.

Sharpe, op. cit. XIII. pp. 82, 318, 500; Ramsay, op. cit. I. p. 391.

An abundant species everywhere.

Loc. Hall Sound.

Family MUSCICAPIDÆ.

49.—MICEÆCA FLAVIGASTER, Gould.

Gould, P. Z. S. pt. X. p. 132. id. Bds. Aust. fol. vol. II. pl. 94; id. op. cit. Handbk. I., p. 261; Ramsay, List. Aust. Bds. in op. cit. II. p. 182; Salvad. & D'Albert. op. cit. VII. p. 817; Salvad. op. cit. II. p. 23; Sharpe, op. cit. XIII. p. 498.

I do not observe any material difference between the New Guinea specimens and those from Northern Australia; as Mr. Sharpe remarks, the yellow line over the eye is a little more defined, and some individuals are a trifle larger than others, but these variations are also found in Australian examples I collected at Rockingham Bay.

Loc. Hall Sound, "frequenting the Mangroves."—(G. M.)

51.—MYIAGRA RUBECULA, Lath.

Ramsay, List of Aust. Bds. in op. cit. II. 182; Myiagra nitida, Gould, Bds. Aust. fol. vol. II. pl. 91.

A female, apparently referable to this species was obtained by Mr. Masters, it is intermediate in size between *M. plumbea* and *M. nitida*, but not of so bright a tint on the chest and throat as is

observable in the females of the latter, the rust-red of the under surface is continued to the flanks. Total length, 6.7; bill from forehead, 0.75; from nostril, 0.4; from gape, 0.8.

It is certainly neither *M. concinna*, nor *M. latirostris*; but Mr. Masters informs me he has received a specimen of *M. nitida* (Gould), from Port Darwin.

One specimen only.

Loc. Hall Sound.

51.—*RHIPIDURA GULARIS*, Mull.

Salvad. and D'Albert, t. c. p. 820; Salvad. op. cit. IX. p. 24; Sharpe, op. cit. XIII., p. 498; R. isura, Gould; setosa, Q. et Gaim, Voy. de l'Astrol. I. p. 181., pl. 4., fig. 4 (1830); Ramsay List of Aust. Bds. in op. cit. p. 182.

I find very little difference between Australian specimens of *R. isura* (Gould), those from the Duke of York Islands, and those at the present under consideration from New Guinea; I believe them to be mere varieties of one and the same species.

Loc. Hall Sound.

52.—*SAULOPROCTA TRICOLOR*, (V.)

Salvad. and D'Albert, t. c. p. 819; Salvad. op. cit. IX. p. 24; Ramsay, op. cit. I. p. 392; Monarcha tricolor, Sharpe, op. cit. XIII. p. 498.

Closely allied to if not identical with, *Sauloprocta motacilloides* (V. and H.), from which it differs only slightly in size, habits, actions, and voice, exactly the same as the Australian species. (*Masters.*)

Loc. Katau.

53.—*PIEZORHYNCHUS ALECTO*.

Drymophila alecto, Temm., pl. col. 430; Piezorhynchus nitidus, Gould, Bds. Aust. fol. vol. II. pt. 88; Sharpe, op. cit. XIII. pp. 316, 498; Ramsay, op. cit. I., 391; id. List. Aust. Bds. in t. c., p. 182; Muscicapa chalybeocephalus, Garn., Voy. de la Coq. Zool. I. p. 589, Atlas, t. 15, fig. 2. (♀).

Plentiful among the Mangroves. (G. M.)

Loc. Katau.

54.—*MONARCHA CAKINATA*, (V. AND H.)

Salvad. op. cit. IX. p. 24; Sharpe, op. cit. XIII. p. 497; Drymophila carinata, Temm., pl. col. 418., fig. 2.

I quite agree with Mr. Sharpe that it is better to keep the New Guinea forms of this bird under the specific name given by Temmink (t. c.) than create a new species on such trivial differences. The black on forehead and chin varies with age in extent and intensity in the Australian examples also. This species is common at Port Moresby.

Loc. Yule Island.

55.—*ARSES TELESCOPHTHALMUS*, Garn.

Voy. de la Océ. Zool. Atlas pl. No. 19, fig. 1. (♂); Sharpe, op. cit. XIII. pp. 316, 497; Ramsay, op. cit. I. p. 391.

One male obtained by Mr. Masters has the plumage of the female except that the head is black and shows a slight indication of white just in front of the lores, at the base of the feathers; this would seem to indicate that the young males do not attain the black and white plumage until the 2nd year. On comparing females of these species with the figure of *Muscicapa enado*, in the Atlas of the Voy. de la Coquille, pl. No. 15, fig. 2, I feel sure that they are identical, but the fluffy feathers on the hind neck are not well represented in the figure, which may have been taken from a young individual.

Loc. Hall Sound.

Family CAMPEPHAGIDÆ.

56.—*GRAUCALUS MELANOPS*, (Lath).

Gould. Bds. Aust. fol. vol. II. pl. 55.

Loc. Hall Sound.

57.—*GRAUCALUS ANGUSTIFRONS*, Sharpe.

op. cit. XIII. p. 81.

This is undoubtedly a good species, the jet black frontal band slightly raised above the feathers of the forehead, and in some specimens the much lighter colour of the front of the head immediately behind it, will at once distinguish this species from the Australian *G. hypoleucos*.

Loc. Hall Sound, Katan.

58.—*EDOLIOSOMA BOYERI*, *Homb. et Jaq.**Salvad. op. cit. IX. p. 20.**Campephaga strenua*, *Gould*, (*nec. Schleg*) *Bds. N.G., pt. II. pl. 7.*

One specimen, adult male.

Loc. Hall Sound.59.—*EDOLIOSOMA MELAS*, *S. Mull.**Salvad., & D'Albert, op. cit. VII., p. 321; Salvad. op. cit. IX. p. 27; Sharpe, op. cit. XIII., p. 317.*

Male and female.

Loc. Hall Sound.60.—*CAMPEPHAGA MULLERI*, *Salvad.**Ann. Mus. Civic. Genov. VII., p. 927, (1875).*One specimen, a female, referable I believe to this species, which is closely allied to *O. jardinii*, (*Rupp.*)*Loc.* Hall Sound.

Order ANSERES.

Family ANATIDÆ.

61.—*ANAS CASTANEA*, *Eyton.**Ramsay, List of Aust. Bds., op. cit. Anas punctata (Cuv.); Gould, Bds. Aust. fol. vol. VII. pl. 11. p. 200.**Loc.* Hall Sound, Ethel River.

Order GRALLÆ.

CHARADRIIDÆ.

62.—*HIMANTOPUS LEUCOCEPHALUS*, *Gould.**P. L. S., pl. V., p. 26; id. Bds. Aust. fol. vol. VI. pl. 24; Ramsay, List Aust. Bds. op. cit. II. p. 198.**Loc.* Hall Sound.63.—*ÆGIALITIS MONGOLUS*, *Pallas.**Ramsay, List of Aust. Bds. op. cit. p. 197.**Loc.* Katau.

Family ARDEIDÆ.

64.—*ARDEA SACRA*, *Gm.**Gray, Handbk. Bds. III., p. 28; Sharpe, op. cit. XIII., p. 504.*

One specimen only.

Loc. Hall Sound.

65.—*BUTOROIDES JAVANICA*, Horsf.*Grey, Handbk. Bds., vol. III., p. 31.**Loc.* Hall Sound.66.—*NYCTICORAX CALEDONICA*, Sm.*Grey, Handbk. Bds., vol. III., p. 33.**Loc.* Katau.

Order GALLINÆ,

Family MEGAPODIDÆ.

67.—*MIGAPODIUS DUPERRREYI*, Less.*Salvad. & D'Albert, t. c. p. 838; Salvad. op. cit. IX. p. 48; Ramsay, op. cit. I. p. 394; Sharpe, op. cit. XIII. p. 504.*

Plentiful throughout the Southern Coasts and adjacent Islands.

Loc. Hall Sound, Yule Island, &c.On two new species of *Gerygone*.

By E. P. RAMSAY, F.L.S., &c.

GERYGONE INCONSPICUA, *sp. nov.*

This species comes near *Gerygone chloronotus* of Mr. Gould, but differs in having a pure white throat, and the chest, breast, abdomen, and under tail-coverts, citron yellow; from *G. albogularis* it may be distinguished by having the tail of a uniform tint without any bar, or white tips. A spot in front of the lores, and a ring round the eye white; a dark blackish spot under the eye, at the gape; flanks tinged with olive; under wing-coverts white, washed with citron color; tail and wings brown above, the outer webs washed with olive; the quills lighter brown below; shafts of the tail feathers white at the base below, brown above; all the upper surface of the body olive brown tinged with green; bill black, legs and feet lead color. Total length from tip of bill 3·7 in., wing 2·1 in., tail 1·7, tarsus 0·7, bill from forehead 0·5. Sex. ♂ ?

Hab. Scrubs on banks of Lalokie river, where Mr. Alex. Morton informs me he obtained it among the leafy tops of the trees.

GERYGONE INSULARIS. sp. nov.

Total length 4.3 in., wing 2.2 in., tail 2.0 in., tarsus 0.8 in., bill from forehead 0.6 in., from gape 0.6 in., from nostril 0.3 in., hind toe 0.3 in., middle toe 0.4.

Ad. male. The whole of the upper surface olive-brown, becoming deeper olive-brown on shoulders, back, and upper tail-coverts; wings dark brown, the outer webs olive brown, the inner webs margined with white; under wing-coverts white; axillaries yellow, tail dark brown above, with a blackish subterminal bar near the tips; the outer webs above margined with olive-brown like the upper tail-coverts; the outer feather on either side crossed near the tip with a band of white, the next two on either side with a spot of white only on the inner web, decreasing in size on the remainder until it is altogether lost on the two centre feathers; lores dark brown, a white semilunar mark above and below the eye, on the eyelid; sides of the head and neck, the throat and chest ashy grey; breast white or nearly so; sides of the body, flanks, abdomen, and undertail-coverts yellow; tail feathers rather pointed, with a distinct brown tip; bill black, legs brown.

Hab. Lord Howe's Island.

This species differs from *G. flavolateralis* (Grey) from New Caledonia in having a wash of olive brown extending over the head and back of the neck. In *G. flavolateralis*, these parts are an ashy brown; the white spot on the tail feathers is nearer the tip on the inner feathers; the basal portion of the feathers below is white, and the undertail-coverts are white; the tips of the feathers more rounded, the throat and breast are white, no olive brown on the wings or back, the olive tint of these parts is of a yellowish tinge; the bird is altogether smaller.

Total length 3.8, wing 2.05, tail 1.75, tarsus 0.71, bill 0.5, from nostril 0.28.

The yellow on the under surface of the body commences on the lower part of the breast in this new species; but in *G. flavolateralis* the throat, chest, breast and centre of the abdomen are white.

GERYGONE IGATA, Garn.

Voy. Astrolabe, XI, fig. 2.

This species is very like *G. insularis*, from Lord Howes

Island but may at once be distinguished from it in having a clear well defined white line in front of the eye from its upper margin to the forehead. For description see Voy. Erebus and Terror, Birds of New Zealand, p. 5.

Hab. Tasman's Bay, Cook's Straits. Native name "*Igata*."

In the Australian Museum we have a bird from New Zealand which agrees well with the figures in Voy. Astrolabe of *G. igata*, but has the lores blackish slate color, and no white ring round the eye; there is a tinge of olive on the sides; from the chest downwards, and under tail-coverts white; the three outer tail feathers are *crossed* with white on the *under* side, but the outer *two* only on the *upper*; the black band on the tail is much wider extending over about half the feathers.

On the FERNS OF QUEENSLAND.

By F. M. BAILEY, F.L.S., Hon. Corr. Memb. Linn. Soc.,
N. S. Wales.

I am induced to offer the following remarks to the Society as a kind of addition to the seventh volume of Bentham and Müeller's "*Flora Australiensis*," which has just reached my hands. This volume is to many of us perhaps the most interesting of the whole work. The third class, Cryptogamia, is carried on to the ferns, and in this department the arrangement followed has been Hooker and Baker's Synopsis Filicum. By this arrangement, the genera *Elaphoglossum*, Schott, *Lomariopsis*, Fée, *Stenochlana*, J. Sm., *Pacilopteris*, Presl, *Hymenolepis*, Kaulf, of my handbook are placed under the one genus, *Acrostichum* of Linné, to which should have been added the beautiful *Pacilopteris virens*, T. Moore, which I found in one of the deep gullies of the Trinity Bay Range. At the time I thought it was only a form of *P. repandum*, Pr., until my mistake was pointed out to me by Dr. Prentice, of Brisbane, who is certainly one of the best Pteridologists of Australia. *Acrostichum pteroides*, R. Br., is now added to the list of Queensland ferns, as it has been found on the Gilbert River, by Armit.

Gymnogramma, Desv., and *Dictyogramma*, Fée, are placed in the genus *Grammitis*; but, unless it is meant to be represented by *Grammitis ampla*, F. v Müller, what I take to be *Selliguea pothifolia*, J. Sm., is left out. This is one of the most conspicuous objects in our far northern scrubs, as it completely clothes the stems of the trees with its large pinnatifid fronds, that rival, both in size and beauty, *Rhaphidophora pinnata*, Schott, a rampant climbing plant of Aroidæ.

Dichidopteris angustissima, of Brakenridge, is placed under Sir William Hooker's name of *Monogramme Junghuhnii*; *Woodwardia* is described as *Doodia*; the genus *Schizoloma* is placed with *Lindsaea*, the species *L. media*, R. Brown, as *L. flabellulata*, Dry; *L. concinna*, J. Sm., as *L. cultrata* Sw.; *L. lobata*, Poir, is added, having been collected by N. Taylor at the Endeavour River, and Hull River, by W. Hill. No alterations are made in the species of *Adiantum*, in my book, but the following are added:—*A. affine*, Willd, which I gathered at Maroochie some few years ago; *A. capillus-veneris*, Linn., collected by O'Shanesy at Northampton;* *A. diaphanum*, Bl, collected on the Daintree by Fitzalan, and Southern Queensland by Hartmann. The two distinct species of *Cheilanthes*—*C. sieberi*, Kunze, and *C. nudiuscula*, T. Moore, are placed as *C. tenuifolia*, Sw., without being allowed to rank as varieties. To this is added *C. caudata*, R. Br., having been again met with by Daintree on the Gilbert River. The genus *Litobrochia*, Presl., is placed with *Pteris*, Linn.; *L. vespertilionis*, Presl., as *P. incisa* Th.; *L. tripartita* and *Milnesana*, Baker, as *P. marginata*, Bory; *P. crenata*, Sw., as *P. ensiformis*, Burm. One is also added to our *Pteris*, *P. comans*, Forst, plants having been met with by Mr. Hartmann in Southern Queensland. J. Smith's genus *Platyloma* is also placed under *Pteris*; thus *P. Brownii*, J. Sm., becomes *P. paradora*, Baker. In *Notholaena*, Robert Brown's name *N. vellea* is used for *N. lanuginosa*, Desv.; *Cheilanthes distans*, Braun, will now be found in the Flora as *N. distans*, R. Br., *N. pumilio*, R. Br., must be added to Queensland ferns, having been met

* There is probably some mistake in the habitat given in the Flora for *Adiantum capillus-veneris*, Linn. For Northampton, O'Shanesy, perhaps Rockhampton is meant. But until I saw it in the Flora I was not aware that the form was indigenous to Australia.

with by Mr. N. Taylor on the Endeavour River. But I made a mistake in placing *N. fragilis*, Hook. among our ferns, as it seems not to have been found within our border. The following genera are placed under *Polypodium* in the Flora:—*Goniopteris*, Presl., *G. Ghiesbreghtii*, Lind., Handbook, as *P. Hillii*, Baker, and *G. Kennedy*, F. v. M., of Handbook, is found identical with *G. urophylla*, Presl., *Polypodium rugulosum* is called *P. punctatum*, Thunb; our *Dictyopteris*, Presl., is *P. attenuatum*, R. Br., *Goniophlebium*, Bl., falls into *Polypodium*, Linn., *Niphobolus puberulus*, Bl., into *P. acrostichoides*, Forst. The very small *Niphobolus*, always considered as *N. confluens*, R. Br., is made identical with *N. rupestris*, Spreng, and called *P. serpens*, Forst., while the name *P. confluens*, R. Br., seems to belong to the elongated form of *N. rupestris* so common in Queensland. *Pleopeltis*, Humb. and Bon.; this small genus is placed under *Polypodium*. *P. lanceola*, Metten, to *P. simplicissimum*, F. M., *P. pustulata*, T. Moore, to *P. scandens*, Forst. *Polypodium nigrescens*, Bl., found on the Daintree by Fitzalan, must be added to the Queensland ferns, having been overlooked doubtless many times by collectors from its resemblance to *P. phymatodes*, L., a widespread species. *Drynaria*, Bory, also is placed in *Polypodium*, altering *D. diversifolia*, J. Sm., to *P. rigidulum*, Sw. The genera *Polystichum*, Roth, *Sagenia*, Presl., *Nephrodium*, Rich, *Lastrea*, Bory, *Nephrolepis*, Schott, with *Polypodium pallidum*, Brack, are all placed under Swart's genus *Aspidium*. With regard to the last, *A. tenericaule*, Thw., I must think some mistake has been made, for in the figure, in Hooker's Species Filicum, no indusium is shown, and I have watched our Queensland plants, and never saw, on young or old, the sign of an indusium. I do not find *Lastrea acuminata*, T. Moore, in the Flora. This species, or the Brisbane River variety of it, is, so far as I have observed, exindusiate, and thus a true *Polypodium*. The species to be added to the Queensland ferns are *A. tenerum*, Spreng, a fine species abundant along the Brisbane River, and *A. truncatum*, Gaudich, a northern species, allied to *A. molle*. Sm. The alterations in nomenclature are *Sagenia melanocaulon*, Sm., = *A. confluens*, Metten, *Nephrolepis repens*, Brack, and *N. atescandens*, Handbook, = *A. ramorum*,

Beauv., *N. tuberosa*, Presl., = *A. cordifolium*, Sw., *Polypodium rufescens*, Bl., Handbook = *A. decompositum*, Spreng. The genera *Humata*, Cav., *Microlepia*, Presl., *Dennstaedia Bernhardtii*, and *Dicksonia dubia*, Gaudich, are included in *Davallia*, Sm., to which are added *Davallia tripinnata*, F. v. M., collected by W. Hill on the Bellenden Ker Range, and *D. solida*, Sm., found by M. Thozet on Hummooky Island.

Dicksonia lanata, Colenso, specimens of which I have received from Mr. Hartmann, collected from Southern Queensland; and from Mr. Moulday, collected on the Bunya Mountains, not far from Dalby.

Dicksonia Youngia (C. Moore) is said to have been gathered by W. Hill on the Bellenden Ker Range.

Of the species of *Trichomanes*, the species I took for *T. filicula*, Bory, is *T. pixidiferum*, Linn. This was abundant on the rocks in the deep gullies of the Trinity Bay Range.

Bory's *T. feniculaceum* is called *T. parviflorum*, Poir, in the "Flora." *T. Javanitum*, Bl., found on the Daintree by Fitzalan, is an addition.

The very distinct species of *Schizaea Fosteri*, Sprengel, which I found at Maroochie, has been overlooked or mixed with *S. dichotoma*, Sw., as in the Synopsis, but besides this latter species being a much more robust plant, they choose always very different habitats.

I feel sure that the fern I found so plentiful on the ranges at the back of Cardwell, and of which I brought to Brisbane specimens, both dried and living, was *Blechnum nitidum*, Presl., as given in the handbook, but in the Flora it is stated to be only a slight variety of *B. cartilagineum*. This was perhaps on account of my having neglected to say in handbook that the Queensland form, formed a caudal like rhizome of from 6 in. to 24 in. high.

The genera *Thamnopteris*, Presl., *Diplazium*, Sw., and *Callipteris*, Bory, are all under *Asplenium* in the Flora, to which are added *A. maximum*, Don., of the Daintree River and Rockingham Bay; and *A. sylvaticum*, Presl., also of latter place.

Lomaria procera, Sprengel, is *L. capensis*, W., but the habitat (Maroochie and Cooper's Plains) not given.

Lomaria discolor, W., and *L. vulcanica*, Bl., are both noticed in the Flora as from Rockingham Bay. The first named I found at Maroochie four years back, but that habitat is not given, although I at the time sent it to the Baron von Mueller. Very likely it has been overlooked. We must not be surprised at such omissions, or the necessary corrections specified. Indeed it is to the highest credit of the learned authors that in a work of such magnitude the errors are so few. But botanists should be careful in the interests of science to verify for themselves everything in the Flora, because it is but the commencement of a work which must be followed up, and many of their remarks will be valuable for the supplement which I understand is to follow.

Baron Miklucho-Maolay advocated the establishment of a Zoological Station near Sydney, and explained the benefits to scientific research, afforded by such institutions.

The suggestion was warmly supported by the Rev. J. E. Tenison-Woods, F.G.S., &c., and other members of the Society.

EXHIBITS.

Mr. J. Brazier exhibited the shells described in his paper, viz., *Helix Bebias*, *H. Zebina*, *H. Bala*, *H. Mazee*, *H. Nicomede*, *H. Beddomæ*, and *Voluta Bednalli*; also a new *Helix* from Port Moresby, and a *Holothuria*, dredged at the Heads of Port Jackson. Dr. Cox remarked that the *Helix* from Port Moresby was almost identical with a species found at the Philippine Islands.

MONDAY, 26TH AUGUST, 1878.

W. J. STEPHENS, M.A., President, in the Chair.

DONATIONS.

- I. Compte Rendu Societe Entomologique de Belgique, Serie II., No. 52, from the Society.
- II. Journal of Conchology from the Editor.

PAPERS READ.

ON TWO NEW SPECIES OF LAND SHELLS,

By the Rev. J. E. TENISON-WOODS, F.L.S., F.G.S., Hon. Cor.
Mem. Linn. Soc. N.S.W.

Plate 12, Figs. 2. 3. 5.

The following new species were placed in my hands for description by Dr. James C. Cox, F.L.S. The first is from Tasmania. A medium sized form, very closely allied to *Helix atramentaria*, of the Dandenong Ranges, Victoria. In color, enamel, and the form of the embryo it is very similar, but it is smaller, more sloping, less discoid, and of fewer whorls. I have figured both species on the accompanying plate, so that the differences may be seen at a glance. It is very desirable that the animal should be studied, as the highly enamelled exterior surface, which is also smooth, renders it probable that the Victorian shell is also a *Helicarion*, with a caudal gland. The membranaceous edge makes it very probable. It should be observed that without a knowledge of the animals Albers * places our Australian *Vitrina* as *Helicarion*. This genus was established by Ferrussac in 1821, for the Australian *H. Freycineti* † G. B. Sowerby subsequently united it to *Vitrina*. Latreille, Blainville, and Sander Rang regarded it only as a sub-genus. Menke, in 1830, and Beck, in 1837, ‡ revived the genus, which is thus defined by Adams:—"Mantle with two free lobes in front on the

* *Die Heliceen*, Leipzig, 1880, 2 edit., by Von. Martens, p. 46. *Helicarion* is made a subgenus of *Neritina*, Gray.

† See Voy. de Freycinet, Zool., p. 465.

‡ Index Moll., Prince Christian Frederic, p. 2.

neck, and a large lobe on the right side covering the hind part of the shell; foot truncate posteriorly; shell rotundately oval, heliciform, thin, fragile, covered with a thin epidermis; spire short, aperture large, peritreme simple, acute, straight. The species of this genus have an extensive fold of the mantle developed on the right side. Their foot is truncate, and their shells are very thin." Vol. 2, p. 226. The general resemblance of this shell in color, &c., to those which are clearly of the genus *Helicarion*, induces me thus to classify it:—

HELICARION FUMOSA, n. s., Pl. 12, fig. 3, 3a.

H. t. umbilicata, turbinato-discoidea, tenuiuscula, politissima, lineis incrementi rugulosa, intensè fumoso-cornea vel subnigra, unicolor (apice excluso,) translucens; spira parum exserta, apice prominulo, sutura subtilissime corrugata; anfr. $3\frac{1}{2}$, rapide accrescentib. Embryonales $1\frac{1}{2}$, albidii, ultimo valde declivo-rotundato, basi rotundata; apertura quasi orbiculata. Peristoma corneum, simplex, obtusum, incurvatum, marginibus ab umbilico usque ad $\frac{1}{3}$ ultimi anfractus disjunctis: Columella acuta, declivis. Umbilicus angustissimus, profundus.

Diam. maj. 22, min 14, alt 18, millim.

OBS. *Sp. eleganter polita, et intense subnigra saturata, forma vero, colore et aspectu H. ATRAMENTARIA*, Pfr. Dandenong Ranges, Victoria incolanti, valde proxima.

Shell umbilicate, turbinately discoid, rather thin, highly polished, uneven from the lines of growth, intensely smoky horn color or nearly black throughout except at the apex, translucent, spire somewhat exsert, with the apex very slightly prominent, suture very finely corrugated; whorls $3\frac{1}{2}$ increasing rapidly; embryonal $1\frac{1}{2}$, whitish, last whorl largely rounded and sloping, aperture almost orbicular. Peristome horny, obtuse, incurved, margins disjoined from the umbilicus for about $\frac{1}{3}$ of the last whorl. Columella acute, sloping, umbilicus very narrow and deep.

This species is elegantly polished, and of an intense dark smoky brown, but in its shape, color, and general habit it is very close to *H. atramentaria*, Pfr. but that it is much smaller. There is a peculiar in-turning of the horny margin, which makes it rounded and blunt.

The next species is a very small shell from Victoria, closely resembling *H. mucosa* Cox of N.S.Wales.

HELIx MUCOIDES, n.s., Pl. 12, fig. 5, 5a.

H. t. minuta, late umbilicata, depressa, orbiculata, viz discoidea, solidiuscula, nitente vel quasi oleo inuncta, crebre corrugata, vel irregulariter striata, corneo-lutea, unicolor, translucens. Spira exserta, apice prominulo, obtuso. Sutura haud impressa. Anfr. $4\frac{1}{2}$, rotundatis, sensim accrescentibus, ultimo superne planato et obtuse carinato. Basi convexa, ut supra rugose striata sed subtiliori, et (sub lente tantum visis) subtilissima creberrimeque spiraliter liratis. Umbilico eperspectivo, viz $\frac{1}{2}$ diam. testæ æquantis. Apertura subquadrata, intus pallidissime cœruleo-albida. Peristoma simplici, marginibus obtusis, haud approximatis, columella parum expansa et reflecta. Testa maculis fuliginosis magnis et irregularibus plus minusve insignita. Forma et colore *H. MUCOSÆ* proxima, minuta vero et inconspicua. Diam. maj. 3, min. $2\frac{1}{2}$, alt. $1\frac{1}{2}$ millim.

Shell minute, widely umbilicate, depressed, orbicular but hardly discoid, rather solid, shining as if from oil, very closely corrugated or irregularly striate, yellowish horn, of one uniform color and translucent. Spire exsert, apex slightly prominent, obtuse. Suture not impressed. Whorls $4\frac{1}{2}$, rounded, increasing gradually, the last flat above and obtusely keeled. Base convex and rugosely striate as above, but more finely, and under the lens seen to be closely, very finely spirally lirate. Umbilicus perspective, scarcely $\frac{1}{2}$ the diameter of the shell. Aperture subquadrate, a very pale blueish white within. Peristome simple with obtuse margins which are not approximate. Columella slightly expanded and reflected. The shell is more or less marked with large irregular sooty patches.

H. mucosa, which it resembles is a very rare shell, but much larger, and the rugose striæ are proportionately much smaller. With this shell was associated *H. melbournensis* Cox, and *H. julioidea* Cox. The latter is a Tasmanian species, but I could see no appreciable difference between the Melbourne specimens and those coming from Mount Wellington.

EXPLANATION OF FIGURES.

PLATE 12.

Fig. 2, 2a, *Helix atramentaria*, for comparison with fig. 3, 3a, *Helicarion fumosa*—both natural size.

Fig. 5, 5a, *Helix mucoides*, much enlarged.

On a new genus of POLYZOA. Pl. 13, fig. 1, 1a, 1b, 1c.

By the REV. J. E. TENISON-WOODS, F.L.S., &c.

The very interesting and curious genus which I now describe was dredged by the Hon. Wm. Macleay, F.L.S., off Darnley Island, at a depth of 10 or 20 fathoms, on coral mud. It belongs to the *Oheilostomatous* sub-order, but differs so completely from any of the described families that its affinities and relations must remain problematical until others are discovered, as no doubt in time there will be. The nearest family is the *Selenariadæ*, which has the polyzoary more or less orbicular, convex on one side, but there is no special modification of any organ in the manner seen in the species under consideration. Its singular beauty, both as regards design and ornament, renders it a remarkable addition to an order where beauty and variety are the rule. I shall distinguish the genus by the name *Euktimenaria*, from *εὐκρίμενος*, well built.

EUKTIMENARIA, new genus.

Polyzoary free, upper surface convex, covered with cells; lower surface divided into five portions, each containing large pores; in the centre of the base a vermiculate quinque-partite body.

EUKTIMENARIA DUCALIS. Pl. 13, fig. 1, 1a, 1b, 1c.

Convex, with pentagonal outline; the edge circumscribed by a raised margin of five arches, whence it descends to a broad pentagonal pedicel by five arched concave surfaces, which are horizontally divided in the centre by a straight raised double ridge, above and below the centre of which there is a large conspicuous pore; the pore above is semi-circular, that below is

perfectly round; both seem deep. The margin of each of the arched spaces curves round into a loop at each side below the lower pore, and is curved again in a contrary direction at each side so as to form another small loop in which there is another small pore. Beneath the lower of the two large central pores there are one or two conspicuous grooves to the base. Upper convex surface covered with concave cells, with a distinct raised margin; mouth in the centre, semi-circular, with a raised margin. Shape of cells from oval to circular, a few almost pentagonal; the centre of the convex surface seems covered with cells, but they are worn almost smooth on both the specimens. The base is vermiculate, but with a radiate tendency, and forming a quinque-partite pattern. Between the margin of the five sides there are upper and lower angular spaces, giving great elegance to the design.

Dimensions: Alt. 6, diam. of summit 8, of base $4\frac{1}{2}$, lat. of 5 lateral spaces $4\frac{1}{2}$, alt. $3\frac{1}{2}$ millim.

I am unable to suggest any explanation of the pores on the sides or the organs which form the margins, transverse bands, &c. It is quite evident that there must be some individuality in these zoothomes, apart from what we call the animal which dwells in the cells, or the symmetrical arrangements in this specimen could not be explained. Only two were found by the Chevert Expedition in all their dredgings, and both these were a little worn as if they had been dead some time. There is something in the species which recalls the elegant forms of Polyzoa in the European chalk, but there is no fossil form that I have heard of which nearly resembles it. There are fossils from the Maestricht Chalk which seem to have some analogy with *Euktiminaria* (one species is named *Glenotremites paradoxus* by Goldfuss), and geologists are not agreed upon their position in classification or their character. M. d'Orbigny considered them as Comatulæ without their arms, but there were reasons for rejecting this view. The mouth (?) was surrounded by five funnel-shaped openings and five petaloid grooves which were probably places for the insertion of arms. All the surface

of the calice was surrounded by perforated depressions which, according to Agassiz, may have been articulations for dorsal rays. There is another species from the chalk of Rugen with the 5 funnel-shaped openings reduced to little pores.

EXPLANATION OF PLATE 13.

Fig. 1. *Euktiminaria ducalis*, side view, slightly enlarged.

Fig. 1a. ditto ditto seen from above.

Fig. 1b. Mouth of cell much enlarged.

Fig. 1c. Base slightly enlarged.

On some CORALS from Darnley Island.

By the REV. J. E. TENISON-WOODS, F.L.S., &c.

Plates 9 & 11.

Among the many corals brought from Darnley Island by the Hon. W. Macleay, F.L.S., as the result of the Chevert Expedition, there are three which seem to vary sufficiently from any hitherto described to entitle them to specific description. At the same time I do not positively say that they are new species, as I am not sufficiently acquainted with the extent to which these reef-building forms vary in their modes of growth. The hemispherical *Symphyllia* here described does not appear to have any congener of its peculiar habit and size. The *Mussæ* form reefs round Darnley Island with many others, but especially *Seriatopora subulata*, Ellis. I propose shortly to give a list of all the North Australian forms, and in the meantime these species may be noted.

SYMPHYLLIA HEMISPHERICA, n. s. Plate 9, figs. 1, 2, 3, 4.

Corallum largely hemispherical; calices seldom simple, sometimes as many as eight in one valley; irregularly concave, shallow (from 4 to 6 millimetres in depth), with apparently six systems and four cycles, or occasionally five, but they are unequal and irregular, and very difficult to make out. Septa equal, the higher orders often uniting a short distance from the

columella, all armed with long spines which are longer exteriorly. Columella altogether rudimentary, not distinguishable from the contorted ends of the septa. Walls narrow, intimately united, leaving only a distinct deep sinuous groove of equal width. As the corallum is perfectly hemispherical and lies on a flat base, to the edge of which the calices are continuous, there is scarcely any epitheca to be seen. Underneath, the calices are nearly always in broken sections. Where they are complete the epitheca is thick, in rugose folds, with many round granulations. The calices on the base appear like radiating tubes. Endotheca very abundant and in regular planes, corresponding frequently on opposite sides of the septa, so as to seem almost like continuous floors across the tissue. Diameter of the corallum 360, alt. 180, length of valleys 20 to 85, lat. of crests of walls 5, lat. of calices 10 to 15 millim.

Plate 9, fig. 1, corallum seen from above much reduced in size ; fig. 2, two valleys, nat. size ; fig. 3, side view of calice from base, showing epitheca and endotheca ; fig. 4, side view of corallum much reduced.

This coral differs from any described in being hemispherical. It is nearest in the character of its valleys to *S. sinuosa*, Dana. The calices are large, wide, and deep, but perhaps not so large as in the species just named. Darnley Island. The specimen from which the drawings were made is in the Macleayan Museum. Messrs. Quoy and Gaimard who describe *S. sinuosa* (*Meandrina* to them) say that it is almost flat. They quote Ellis for the fig. as p. 60, which should be p. 160, pl. 48. To Ellis it was a Madrepore. The figure is not good, but an attempt is made to express the mural valley by a white line. His diagnosis is *Madrepora conglomerata* ; *anf. palulis flexuosis, brevibus, dissipimentis inaequalibus, ezesis, ambulacris subduplicatis, lamellis denticulatis. Hab. in Oceano Indiae occidentalis* (J. Grey). *Varietas anf. anphioribus et toto corallio grossiore.*

MUSSA SOLIDA, N. S. Plate 11, figs 6, 7, 8. Vel var.

Corallum but little elevated, in very long series, which do not show sinuations for the calices but very deep lobes ; sometimes

as many as six calices in a series; *walls* very thick, with a few scattered short spines on the outside; *epitheca* coarse, granular, ascending about two-thirds to the margin with a few spines, with no signs of costa; septal spines few, thick, but very prominent on the margin, fewer, and still conspicuous towards the centre; *calices* very irregular; *fossæ* regularly concave, shallow, spreading; systems irregular and difficult to follow; septa few, rather wide, alternating large and small, much thicker at the margin, where they bear two or three spines longer and stouter than any others; *columella* open, lax, twisted, small; endotheca not abundant. Dimensions, alt. of corallum 50, most of the fasciculæ are three times as long and half that width. Length of calicinal valleys 10 to 80, width 15 to 20, width of wall 5 to 8 millimetres.

The coral has a green waxy appearance on the outside of the wall with fine scattered spines and only faint traces of costa close to the septa. It differs from *Mussa angulosa*, Ellis (as *Madrepora*) in being smaller with columella less developed and no costæ. It appears to be common at Darnley Island and Torres Straits. Plate 11, fig. 5, single calice nat. size; fig. 6, side view of corallum; fig. 7, section of calice; fig. 8, corallum seen from above.

MUSSA LACINIATA, N. S. or var. Plate 11, figs. 1, 2, 3, 4, 5.

Corallum spreading from a narrow pedicel with single calices sometimes free or spreading in series of three or four. *Walls* with scattered spines in linear series. *Epitheca* conspicuous, but showing the costa which are more or less visible from the base. *Calices* inversely conical, moderately deep, irregular; systems, six in five cycles. Septa thick according to the orders, the higher orders with few, short, numerous, the others with a few long angular teeth, the largest ones generally at the edges. *Columella* small open lax. *Corallum* 100 to 150, mill long, 80 to 100 broad. Single calices about 20 by 15. Altitude of tuft about 110 mil.

In this species, some of the septa rise very high above the wall in thin laminae, 5 millimetres long. It is something like *M. corymbosa*, of the Red Sea, but has a columella and costa

Plate. 11, fig. 1, side view of corallum half size ; fig. 2, compound calice nat. size ; fig. 3, corallum seen from above half size ; fig. 4, section of calice nat. size ; fig. 5, a simple calice nat. size.

EXPLANATION OF PLATES.

PLATE 9.

- Fig. 1. *Symphyllia hemispherica*, corallum much reduced.
 Fig. 2. One calicinal valley, nat. size.
 Fig. 3. Side view of single calice showing epitheca. Taken from the base.
 Fig. 4. Side view of corallum much reduced.

PLATE 11.

- Fig. 1. *Mussa laciniata*, half natural size.
 Fig. 2. Calicinal valley natural size.
 Fig. 3. Corallum seen from above ; half natural size.
 Fig. 4. Section of single calice natural size.
 Fig. 5. Same calice seen from above.
 Fig. 6. *Mussa solida*, side view of corallum, half natural size.
 Fig. 7. Section of single calice.
 Fig. 8. Corallum seen from above ; half natural size.

NOTE.—It is said that a reef building species of *Mussa* and probably the last named *M. solida*, extends very far outside the tropics as far indeed as Port Jackson. Specimens have been brought to me, but rather worn and like *M. echinata*, but I have not been able to satisfy myself that they really grew where it was said, on rocks below tide marks at Bondi. We must remember, however, that on the west side of the continent reef building forms and reefs as well are found as low nearly Lat. 30° S., only 3 degrees N. of Bondi, and that a warm and strong sea current comes down to us along the coast from the tropics.

ON SOME NEW EXTRATROPICAL CORALS.

By the REV. J. E. TENISON-WOODS, F.L.S., F.G.S., &c.

Plates 12 and 13.

Some short time since, Capt. Hutton, Professor of Natural science in the University of New Zealand, and Curator of the

Dunedin Museum, sent me some corals which he had collected at Auckland, Wellington, &c. I propose to describe two of them here, together with a small one from the north-east coast of Australia. The first was found on some old metal near the slip at Wellington, therefore may have been introduced. But it should be mentioned that the metal is lead and not copper, and probably not from a ship's bottom. It has been pronounced by some naturalists of experience in corals, to be a worn specimen of *Cylidia Smithii*, but this it cannot be for the following reasons : The calices have no epitheca, but very distinct costa. There is no columella, but the septa meet in the centre and throw up long slender processes which are like a columella when seen from above. Many of the calices are cemented by a very compact granular coenenchyma, which rises almost to the edge; and finally the calices in this specimen, though broken, are not worn as the most delicate of the slender processes from the septa are unbroken. The false coenenchyma is peculiar, but still I think not of generic importance, for like the epitheca, it seems to be secreted or not according to the exigences of the animal. This is one of the facts which tend to show that the whole group of the *Astrangiaceae* needs revision. There is also a marked peculiarity in this genus, which is that the calices seem to have grown by throwing out another calicular margin above and outside the old one, through which the septa are continuous, so that the old margin forms a crescentic line of endotheca within. This new wall rises on the higher side, and gradually slopes and unites with the lower side, so as not to be seen there. I am not aware that the species has been hitherto described, and I therefore propose to dedicate it to my learned friend Capt. Hutton, whom I am happy to acknowledge, as one of the most zealous and industrious naturalists of the Southern Hemisphere.

CYLIDIA HUTTONI. Plate 12, fig. 1.

Corallum very short, only slightly inclined, and regularly and broadly oval; no epitheca, but a false exotheca, compact, and granular, often uniting the calices, and completely filling up the space between them; *costa* distinct, broad, flat, granular, corres-

ponding to the septa; *calices* deep; *septa* thin, close, not exsert, very faintly and finely granular; systems six, cycles four, but the fourth wanting in two systems; primaries smooth at their upper edge, deeply and very delicately lobed in the lower part, where the lobes form a false columella;* on the higher side of many of the calices there is a second margin as mentioned above. Dimensions, alt. $3\frac{1}{2}$ to 4, maj. diam. 5, min. diam. 4.

In the curious specimen which is figured, it will be observed that one of the calices seems partially formed within a larger one, and that in another there is one septa-costal processes almost extending, as in some of the *Astræa*, across to the contiguous calices. The figure of plate 12, fig. 1, is slightly enlarged.

I have already observed in my monograph of the Australian extra tropical corals that there is much confusion about the habitats of the species of *Oylicia* given in Edw. and H. Prof. Duncan refers *C. Smithii* to S. Africa.

The species to which I next call attention belongs to the fifth group of the Astrean family, the *Astrangiaceæ* or corals which multiply by buds on a basilar expansion. It is a very small species and has only one complete cycle, with rarely in some systems the rudiments of a second. There is only the slightest trace of any serrations at the edge of the septa and the visceral cavity is completely flat and smooth at the bottom and not even a remote sign of a columella. The size of the calices and the fewness of the septa might induce one to suppose that they were young specimens. But the buds of any species known to me are not at all like this, and as the calices become narrower from the base to the summit, though it might increase the number of septa would not enlarge the calice. There are two very small species of *Oylicia* referred to by Messrs. Ed. and H., but they are doubtful as to their being really members of the genus. The absence of any signs of a columella and the entire septa are generic distinctions, yet I think it better for the present to place this interesting species amongst the *Oyliciæ*.

* This is seen very clearly when a section is made across the calic

CYLICIA VAGUA, N. S. Plate 12, figs. 4, 4a, 4b.

Corallum very small, circular, much inclined, with a broad base which sends out thick rounded buttress-like expansions; *costa* broad, obtusely angular, corresponding with the *septa*; *epitheca* shining, covering the corallum with numerous small chevron-like close rounded folds, giving rise to a "herring-bone" pattern; *calice* circular; *wall* thin, somewhat higher than the *septa* which are six in number, not exsert, projecting very little into the calice, only slightly more advanced at the base than at the calicular edge, and all studded at the base with long processes projecting at right angles from the face; no columella. Dimensions, alt. $1\frac{1}{2}$, lat. 2 mil.

On *Flabellum rubrum*, Wellington, New Zealand. Plate 12, fig. 4, coral on *Flabellum*, nat. size, 4a, side view, much enlarged, 4b, coral seen from above.

The following coral is remarkable as being a third species of *Placotrochus* differing considerably from the two previously known. It is smaller, more solid, and with a distinct pedicel. There are three known Australian Miocene species, namely, *P. deltoideus*, *P. elongatus*, and *P. elegans*. From all of these also it differs in its pedicellate form. It is not so small as *P. elegans*, but is more solid.

A synopsis of the fossil species would stand thus:—1. Broad and pointed, *P. deltoideus*; 2. Narrow and pointed, *P. elongatus*; 3. Base nearly as long and broad as calice, *P. elegans*. The synopsis of the living species is as follows:—1. Short with a basilar scar, *P. laevis*; 2. Long with a compressed spine at the base, *P. candeanus*; 3. Flabellate and pedicellate, the present species.

PLACOTROCHUS PEDICELLATUS, N. S. Plate 13, figs. 7, 7a.

Corallum small, flabellate, rather solid, rising from a thick wide pedicel, from which it spreads abruptly (instead of sloping gradually) at rather more than a right angle; *costa* little raised, obtusely angular, covered with very distinct close herring-bone markings; *calice* narrowly elliptical, the two ends of the major axis sharply angular, and about half the whole height below the

minor axis, from which the marginal outline is regularly curved ; *fossæ* shallow, not so deep as the line along the major axis ; *septa* thick, granular, not exsert in four cycles of six complete systems ; fourth and fifth orders very small, the rest equal ; columella thick, rising in two lobes and attached to some of the *septa* by processes which proceed from them ; pedicel broadly elliptical. Dimensions, alt. 5, maj. axis 5, minor $2\frac{1}{2}$, alt. of pedicel 2, diam. in direction of maj. axis 2, minor 1.

Princess Charlotte Bay (?) 10 fathoms. Hon. W. Macleay.

Plate 13, fig. 7, corallum much enlarged ; fig. 7a, calice.

On some FRESHWATER SHELLS from New Zealand.

By the Rev. J. E. TENISON-WOODS, F.G.S., &c.

Plate 13, figs. 2, 3, 4, 5, 6.

The following freshwater shells were submitted to me for examination by Captain Hutton, F.G.S., from Lake Guyon, and Taieri River, with three species of *Bythinella* from the same localities. From the list given by Edward Von Martens, it appears that he regards *Paludestrina* and *Hydrobia* as synonyms and = to *Amnicola*, Gould. In July of this year, I sent a paper to the Royal Society of Tasmania, in which I reviewed the whole synonymy of *Hydrobia*, *Amnicola*, *Lithoglyphus*, *Paludestrina*, *Paludina*, *Paludinella*, *Littorina*, and *Bythinia*, all of which have at one time or another been regarded as names for the same kinds of shells. After having sent away my paper I was allowed to withdraw it, having found that P. Fischer had in the Journal of Conchology for April, 1878, given a valuable note on the same subject. I was thus enabled to incorporate his conclusions with my own, he having the advantage of seeing types of the genera he dealt with. His conclusions were nearly the same as I had arrived at, except that I was not aware any more than Von Martens, that Hartmann's *Hydrobia* entirely referred to marine species. Now Martens, it appears, regards *Hydrobia corallæ* of Gould, as the type of Stimpson's *Potamopyrgus*, an opinion which is hardly shared by P. Fischer, as far as I can

gather from the paper referred to. Mons. Fischer's conclusions are that the genera *Hydrobia* and *Paludestrina* are synonyms, including marine and fluviatile shells, but as Hartmann only employed the term for marine shells, the name should be confined to them. 2. That *Paludinella* and *Assimineia* are synonyms. 3. *Amnicola* is probably a genus peculiar to America. 4. The little fluviatile species of *Paludina* with spiral opercula, should be arranged under the genus *Bythinella*, which is the only genus specially erected for them. 5. The marine species should be called *Littorinella*. 6. Mons. Fischer doubts however if the marine and fluviatile forms are generically distinct. Any further remarks on the subject are contained in my paper read before the Royal Society Tasmania. I merely state that I adopt the conclusions of Mons. P. Fischer.

Genus BYTHINELLA, Moquin Tandon, 1855.

Bythinella coralla, Gould (*Melania**), Boston Soc. Nat. Hist., vol. 2, p. 4. "This," says V. Martens, "is a very variable shell, sometimes with spines and sometimes destitute of them." Some of the figures of the species from the different authors who have given it different names, vary very much, yet I have no doubt that the shell is in every case the same as that which is represented on the accompanying plate; and I have but little doubt also that these forms are specifically identical with others under different names which are found in Australia and Tasmania. At least I cannot point out any single feature upon which I could rely for their distinction. Under these circumstances, it will serve no useful purpose to multiply names any more than to say that those shown on plate 13, figs. 2, 3, 5, are what I distinguish as variety a. and b. The differences between this shell and *B. Wisemaniana*, Braz., are that the spines are always distinct on the New Zealand shell, but they often merge into a keel on the species named. I think also the latter is a less turriculate and more turbinate form. The absence of these spines or keel from some of the specimens, is I imagine, wholly attributable to the fact that these features result from a periostraca which readily disappears.

* Either Reeve's figure of the shell is incorrect or the species must be different as the periostraca is not continuous.

It will be remarked that those forms which have no spines are clean, smooth, diaphanous shells. All the specimens seen by me have more whorls, are more solid, and generally larger shells than those of Tasmania and Victoria; the operculum is few whorled with a lateral nucleus; some portions of it are almost transparent, while there are darker spots of reddish brown color, and the whole seems covered with a secondary exterior membrane of sooty appearance rather like the periostraca. A smooth variety is represented at plate 13, fig. 3. *Paludestrina Oumingiana*, M. P. Fischer, (Jour. Conch. 1860, p. 208,) is said by its author to be distinguished by its globular ventricose form; absence of spines on $3\frac{1}{2}$ first whorls, their greater number (17—20) on last whorl; their length, obliquity (curving towards spire); the obsolete keel on last whorl corresponding to spines; the peristome slightly thickened and entire. *Paludestrina salleana*, Fischer, is more conical, less globular, shorter spines, and on four last whorls, keels lirate but below the spines; last whorl less proportionately swollen. The figure of these two shells in the journal referred to seem to me to be too highly colored and would not lead one to infer that the spines arose from a periostraca, which they certainly do.

The *Physas* sent to me differ considerably from the only two attributed to New Zealand by Von Martens, *P. tabulata*, Gould, and *P. variabilis*, Gray; but there are many more described by Reeve who does not notice the latter by Gray.

Physa tabulata is a much more inflated shell than the one first to be described; stouter, more solid, especially in the columella. *P. Novæ Zelandiæ*, Gray, is nearer but still wider, more flattened, and with a thicker columella. *P. antipodea*, Sow., is elongated and not flattened. *P. gibbosa*, Gould, (*Wilkes Expl. Exp.*) is very like it and corresponds closely in size and colouring. Gould's description is "*breviter subcylindracea, pallide straminea, polita, spira brevi, conica, acuminata, ult. anfr. superne gibbosa vel rotundate angulata, antice attenuata, apertura elongata, labio externo rectiusculo, plica columellari, brevi tortuosa*. There are quite sufficient differences to make one decide on calling the following a new

species. The differences are the color, the double angle on the whorls above and below the flattened portion; but I do not deny that they may be only varieties of one type of which *P. tabulata* is the extreme.

PHYSA GUYONENSIS, n. s. Plate 13, fig. 4.

P. t. subumbilicata, ovata, tenuis striata lineis incrementi tantum, parum nitente, opaca, superne corrossa, luteo-cornea vel olivacea, plus minusve sordide atro nebulosa; anfr. 4, valde declivibus, rapide decreascentibus, ultimo valde superanti, medio late planato, 2 carinis obsoletis insignito; spira brevi, acuta; apertura late ovata. Peristoma acutum rotundatum, Labio reflexo, columella crassiuscula. Long. 13, lat. $7\frac{1}{2}$ long. apert 9, lat. 5, long. spire 4.

Lake Guyon, New Zealand.

Shell subumbilicate, ovate, slightly striate with the lines of growth only, somewhat shining, opaque, corroded above, yellowish horn or olive, more or less sordidly clouded with black; four whorls rapidly decreasing and very much sloping; last much larger than the rest, and broadly flattened in the middle, with two obsolete keels in the midst, short, acute, aperture broadly ovate. Peristome acute, rounded, lip reflected, columella rather thick.

This species seems especially distinguished by the short spire, the sloping form, the flattened last whorl which has a faintly rounded keel above and below it. The thickening of the columella and the subumbilication are also peculiar. It is an approach to some of the North Australian forms, but not very near, and there is no congener like it in Southern Australia or Tasmania.

PHYSA LIRATA, n. s. Plate 13, fig. 6.

P. t. parva, imperforata, elongato-ovata, sub-diaphana, luteo-cornea, periostraca fuliginosa plus minusve induta; anfr. 4, declivibus, spiraliter punctatis regulariter liratis, superne conspicuis carinatis, lineis incrementi confertis, tenuissimis; spira exserta, acuta; apertura elliptica, peristomate acuto, tenuissimo, labio contorto, haud reflexo, exacte definito, antice valde producto. Long. $9\frac{1}{2}$, lat. 5, long. apert. 5, lat. 3, long. spire 3, millim. Taireri River. Capt. F. W. Hutton.

Shell small imperforate, elongately ovate, shining, sub-diaphanous, yellowish horn, covered more or less with a sooty periostraca; whorls 4, sloping spirally and regularly punctately lirate (liræ somewhat distant), carinate above, lines of growth close and very fine; spire exsert, acute; aperture elliptic; peristome sharp, very thin; lip not reflected but twisted, exactly defined and anteriorly produced.

This shell differs from the preceding in its narrow elongate form and the conspicuous keel. On some specimens a second faint keel above may be noticed. When the shell is covered with periostraca the keel becomes a line of somewhat indistinct granules. This coupled with the faint indistinct dotted line makes me think that the shell in its perfect state or in its young state is covered with a horny periostraca, which has regular lines of spines or hairs at intervals. It would then resemble some of the Victorian and Tasmanian species, except that none of the hirsute kinds are so small as this shell, nor have they any keel. With these exceptions, the present shell comes nearest to *Physa Brunonensis*, Sow., of any Australian congener, and the nearest in New Zealand is *P. mæsta*, H. Adams, which is angled above but longer and more inflated.

The following is a list of all the N.Z. *Physæ* known to me. *P. tabulata*, Gray, *P. gibbosa*, Gould, *P. variabilis*, Gray, *P. Novæ Zelandiæ*, Gray, *P. mæsta*, H. Adams, *P. antipodea*, Sow., *P. guyonensis* and *P. lirata*, Nobis.

EXPLANATION OF FIGURES.

PLATE 13.

Fig. 2. *Bythinella corolla*, Gould; much enlarged.

Fig. 3. Variety a, much enlarged.

Fig. 5. Variety b, ditto.

Fig. 4. *Physa guyonensis*.

Fig. 6. *Physa lirata*.

On Several New Australian (chiefly) Fresh-Water-Fishes.

By COUNT F. DE CASTELNAU.

I publish here the description of seven species of fishes that seem to me not to have been described before :—

One, a *Cheilodactylus*, is from the Melbourne market; two small sorts, forming I believe a new genus which I name *Aristeus*, are from fresh water, one being found in the Murrumbidgee and Ropes Creek and the other in the Rockhampton River; two of *Eleotris*, one from the Fitzroy and the other from the Brisbane rivers; an *Atherinichthys* from a fresh water lagoon connected with the Richmond River, and the last a small fish of the family *Silurida* from the Rockhampton River (Fitzroy).

Six out of the seven are from fresh water. The Australian fishes from this source still are very little known, but I have reason to believe that their number is very considerable. In fact any person collecting even the most common kinds, particularly the small ones, in any river, lake or stream, is almost certain of rendering good service to science.

CHEILODACTYLUS, RUBROFASCIATUS.

Height of body contained a little more than three times in total length up to the base of the caudal; head three times and a half in the same length; dorsal with seventeen spines, of which the 5th, 6th and 7th are the longest; the soft portion is formed of twenty-six rays; this portion is considerably higher than the spinous; caudal strongly emarginated; anal with three spines, the first being the shortest, the second strong and arched, the third long and slender, rays nine; ventrals rather large; pectorals large, of fifteen rays, the six lower ones being simple, the three upper of these longer than all the other rays; body and head covered with scales, rough on their external half, those of the body much larger than those of the head; they number seventeen on the transverse line, and fifty on the longitudinal one; the colour judged by the stuffed skins, and the report of the Taxidermist who skinned

them, seems to have been of a brownish olive, with six broad transverse bands of a rich crimson; head of the last colour; mouth and base of the lower fins of the same colour.

I owe the knowledge of this fine species to Mr. St. John, who procured several specimens in the Melbourne market; they measure from fourteen to eighteen inches in length.

NOTE.—This sort seems to come near *C. zonatus*, which has been found on the Australian west coast as well as the Chinese seas.

ARISTEUS, N. GEN.

This new genus enters the family *Gobiidae*. Body compressed, oval, rather high, with mouth advanced and nearly pointed; two dorsals, the first short, the second long; caudal truncate; anal very long; ventrals inserted very near one another behind the pectorals, and having a spine and five rays; scales large, not ciliated; teeth crowded on both jaws; small pavement-like teeth very numerous on all the bones of the palate; a transverse line of larger and pointed ones on the vomer; opercles entire; cleft of the mouth small not extending to the line from the orbit; head scaly; no distinct lateral line; lower jaw rather larger than the upper one.

ARISTEUS FITZROYENSIS.

The height of the body is twice and a half in the total length, without the caudal fin; there are twenty-eight scales on the longitudinal line; first dorsal formed of one spine and six rays; second dorsal high, formed of a long strong spine and ten rays; the anal high, very long, with one spine and nineteen rays. Color, silvery brown; the fins spotted with pink. Length, two inches and a half. From the Fitzroy River (Rockhampton.)

ARISTEUS FLUVIATILIS.

Nearly of the same form as the preceding, but rather more elongate, the last rays of the first dorsal prolonged into a filament more than half the height of the body; caudal slightly bilobed; second dorsal with a strong spine and twelve rays; the anal with one spine and eighteen rays; the general colour of a silvery dark brown; the fins not spotted.

I have two specimens of this fish, one, two and a half inches long. It comes from the Murrumbidgee, and was kindly given

to me by the Hon. W. Macleay; the other was found by Mr. Duboulay, in Rope's Creek, and is three and a half inches long. It has a very feebly marked black longitudinal stripe on each side.

This genus would, perhaps, in Dr. Gunther's System, be included with *Eleotris*, as it comes certainly near Bleeker's genus, *Asteropterys*, which is in that case, but it is very distinct from it by its long anal fin. This last genus is founded on a species named by Bleeker, *Guntheri*, from the rivers of Sumatra. It is figured by Dr. Gunther in the *Journ. of the Museum Godeffroy* fishes pl. XIII. All these fishes are also nearly allied to the *Eleotris cyprinoidis* of Cuvier and Val. from the river St. Maurice in the Isle of Bourbon.

ELEOTRIS SULCATICOLLIS.

Head large, broad, depressed with a deep longitudinal groove on its upper part; form oval, oblong; body compressed; scales rather large, numbering thirty-four on the longitudinal line; first dorsal formed of six rays, the second of eleven; caudal broad and rounded; anal with one spine and eleven rays; both the second dorsal and the anal with the last rays elongated. In liquor the colour is of a bright yellow with the rays of the fins slightly dotted with black.

The specimen is four inches long; from the Brisbane River.

NOTE.—This sort comes near my *Eleotris planiceps*.

ELEOTRIS ADSPERSA.

Body oval, elongate; head rather broad with a groove on the top of the back part; eleven series of scales between the origin of the posterior dorsal fin and the anal; head entirely scaly up to the snout; height of the body contained less than four times in the total length without the caudal fin; diameter of the eye contained more than four times in the length of the head; the cleft of the mouth does not attain the line from the anterior edge of the eye; first dorsal with eight spines; second high, with eleven rays; caudal rounded; anal, of the same form as the second dorsal, of twelve rays. Colour bright brown with the belly yellow (in liquor); body covered with small rounded dark brown

spots; all the fins finely variegated with brown; several olive brown lines on the sides of the head. This species resembles *sulcatocollis*, but the head is much narrower. From the Fitzroy River (Rockhampton).

The specimen, four inches long, belongs to the Queensland Museum.

ATHEBINICHTHYS DUBOULAY.

Height of the body contained only three times and one sixth in the total length without the caudal fin; head four times in the same; body oval, oblong, compressed; the head rather pointed; the eye contained four times in the head; the spinous dorsal commences a little in front of the insertion of the ventral; the first dorsal formed of one spine and five rays, the three first of which are rather produced; the second dorsal is formed of one spine and thirteen rays, the last of which are rather produced; the caudal is strongly forked; the anal of one spine and thirteen rays, the last of which are rather produced; there are thirty scales on the lateral line.

I owe my specimen of this fish, which is a little over three inches long, to Mr. Duboulay who found it in a lagoon of fresh water connected with the Richmond River. He says that the colours were during life most beautiful; that a broad stripe of magnificent blue ran all along the sides, and that two transverse bands of rich scarlet extended on the upper part of the fish towards the middle of the body.

EUMEDA, n. GEN.

Belongs to the *Siluridae Heteroptera* of Gunther, and probably comes near *Silurichthys*. Body elongate, compressed; eye placed on the upper part of the head; one dorsal fin with a pungent spine; adipose, none; anal very long and joining the caudal which is obliquely truncated; ventrals inserted behind the perpendicular from the dorsal; three pairs of short barbels, on the anterior part of the snout, at the angle of the mouth, and on the lower jaw; lateral line continued all the length of the body; teeth on both jaws numerous crowded and tubercular with a line of sharp conical ones in front; nostrils remote from each other; head and body covered with a soft skin.

MUMEDA ELONGATA.

The long anal joins the caudal and extends upwards on the end of the tail; the colour (in spirits) is brown, becoming lighter on the lower parts; the fins have a yellowish tinge.

The specimen is four and a half inches long. From the Brisbane River, Rockhampton.

PROPOSED ZOOLOGICAL STATION FOR SYDNEY.

By N. DE MIKLUCHO-MACLAY.

The last meeting of the Linnean Society afforded me an opportunity of referring to the subject of a zoological station. On the present occasion I wish to point out the chief considerations which show the necessity of such an institution, to mention a few facts with regard to institutions of this kind already existing, and to bring before your notice those circumstances which would seem to facilitate the establishment of such a station in Sydney.

I shall make my communication as brief as possible, because, in the first place, it seems scarcely necessary to advocate at great length the utility of zoological stations in general before a scientific audience, and secondly, my knowledge of the English language is not extensive enough to permit me to enter upon a very full discussion.

The chief reason why the establishment of zoological stations becomes every day a matter of increasing importance, and presses itself more and more upon the attention of scientific societies, are two in number.

The *first* is the fact that *museums prove insufficient* for the study of anatomy, histology, and still more embryology, if these studies are to satisfy the demands of modern science. In this fact we find the repetition of the universal rule, that as a science develops itself the field of its investigation is correspondingly enlarged, new and difficult problems present themselves, and the progress of the science depends upon the progressive discovery and application of new or improved appliances. It is not only that the

specimens preserved in museums are often *unsuited* to anatomical investigations, and altogether incapable of being used in those pertaining to histology ; but the amount of material in museums is generally *insufficient in quantity*. Now it is undoubtedly upon the quality and quantity of material at command that the value and completeness of the investigation very obviously depend. *Secondly* : Although, hitherto, most scientific travellers follow the same routine, and devote their time and energies to collecting, and that often in the field of several sciences, I cannot but think that the time has arrived when this method should be abandoned, and that in place of mere collecting or making collections, the *great aim of travel should be observation and investigation* exercised immediately, and upon the spot. For this reason I believe that the establishment of zoological stations in various parts of the world corresponding to the regions in which its fauna is distributed from being a fond hope or pious wish will, under the *pressure of absolute necessity* turn into an *accomplished fact*.

The establishment of the Zoological Station in Naples, successful as it has been, and attended with most important results, offers us a proof and confirmation of what I have stated.

But in addition to these two main reasons for looking upon zoological stations in general as things of immediate necessity, another presents itself from a different quarter. I mean the circumstance, that next after the tropics (which are the richest in animal life), the widest field offered to the investigator of nature, and consequently the most suitable region for the establishment of zoological stations, is Australia, with a fauna so interesting, so important and so very far from sufficiently known, especially as regards anatomy and embryology. Such a country would be *the place* for a zoological station, or to speak more correctly, for *several* such stations.

But perhaps many of those whom I have the honor of addressing, while they will agree with me in most of the considerations above submitted, and attach due importance to the Australian fauna, and to the necessity of more thorough investigations of it than collections and museums can supply, would ask me what is to be understood by a zoological station ?

To comprise the answer in as few words as possible, "*it is a laboratory established for conducting investigations in anatomy, embryology, histology, and, if possible, physiology as well.*" The idea is not a new one. In the year 1868, Dr. Anton Dohrn and myself were stopping in Messina for the purpose of zoological studies, and we then became convinced that the establishment of zoological stations was becoming a *vital question, and a necessity for science*. That this was not merely my conviction I will show by quoting the words of my friend Dr. Dohrn himself:—"In spite of a tolerably rich supply of instruments and books, I must, in my regard for the truth, confess that my performances fell very far short of my expectations. It fared no better with my Russian companion, Mikluho-Maclay. We were striking examples of both the cases described above, of labor expended to no purpose, and we were both brought spontaneously to reflect on the great advantages which we might have derived from a well-established laboratory."*

For ten years past I have often found myself, during my travels, in circumstances similar to those experienced in Messina. During my wanderings I have often found myself lodged for weeks and months together in the houses and palaces of noble and even Royal hosts, and yet how gladly would I have exchanged the comforts and splendour of such dwellings for a small but tolerably well furnished laboratory where *undisturbed and undisturbing* I could have carried on my work.

When I arrived in Sydney about six weeks ago, I found myself once more in a similar position.

I had in my voyage from Singapore to this place so far recovered from an illness arising out of a prolonged residence in New Guinea, that I was once more able to work; but there was no suitable place to work in. Ten or twelve days elapsed, and I was still idle. Probably a still longer period would have passed in the same conditions, had not the friendly proposal of Mr. W.

* A. Dohrn. Der gegenwertige Stand der Zoologie, und die Gründung Zoologischer Stationen. Preussische Jahrbücher, Vol. XXX., p. 8 of copy. To those who are interested in this question, I cordially recommend the perusal of the article above quoted, as likewise of another by the same author—Die Einwählung der Zoologischer Station zu Nepal. Vol. XXXV.

Macleay, that I should work in his museum, and his kind offer of hospitality, both of which I thankfully accepted, afforded me the opportunity of continuing my pursuits and saving my time from further waste.

I can even adduce statistical proof to show that mine is *no exceptional case*, but that the *same want* has operated elsewhere.

In the pamphlet upon the opening of the zoological station in Naples in the year 1865, I find this announcement. While in former years the number of zoologists visiting Naples probably fluctuated between *four* and *eight*, already in the first year, from Easter, 1874, to Easter, 1875, no less than *thirty-six* "savans," scientific investigators, have pursued their investigations on marine animals in the zoological station. Of this number 2 were Austrians, 4 Italians, 5 Englishmen, 5 Dutch, 5 Russians, and 15 Germans. That through the establishment of a tolerably good laboratory the number has increased *sixfold*, is a striking testimony *that there is no dearth of willing workers and competent men, but only of suitable places to work in.*

I would add a few words on the stations already existing, and on those projected.

Whether the embryo of the zoological station in Messina, at which Dr. Dohrn and myself laboured, has received further development I know not, but Dr. Dohrn founded what is properly speaking, the *first zoological station* at Naples. This establishment, which cost him about 100,000 thalers, for which the town of Naples gave him gratuitously, but under certain conditions, the best site on the seashore in the Villa Reale, and of which I now present the photographic view, is described by its founder in a letter to me as "*prosperous and flourishing.*" But this letter was written in the year 1875, and since that time I have been for more than two years out of reach of any communication by the post.

In America a similar institution was established in New York under the direction of Professor Alexander Agassiz, and a similar one was projected in Trieste in connection with the Universities of Vienna and Gratz.

Two others have also been established, one in Holland and the other in the English Channel on the Island of Jersey.

In consequence of a prolonged abode in Johor (in the south of the Malay Peninsula), I endeavoured in 1875 to establish a zoological station there. The site, in the very midst of the tropical world, and in the neighbourhood of Singapore appeared to me especially adapted for such a purpose.* This undertaking had nearly reached its completion: the site, a small island, had been liberally guaranteed to me by the British Government, and the plan of the small building had been laid out, when a new voyage to the islands of the Pacific and also New Guinea, interrupted my personal superintendence of the execution of my plan. When, after two years' absence, I arrived at Singapore, I learned to my great sorrow and annoyance that, in spite of all that I had done, my proposal had not arrived at its accomplishment. The illness which ensued upon my return to Singapore—which is also one of the causes which has impelled me to visit Australia—rendered any renewal of my attempt impossible. But I hope, if my wandering life allows it, to realise my deep-felt desire for the establishment of a station in the tropics. The place which I have in view for that purpose is Kema, to the north of the Island of Celebes.

After this short historical survey of the gradual rise of zoological stations, I return to my proposal and pass from the theoretical to the *practical side*.

To summarise briefly what is wanted. We require a *workshop*—a laboratory for zoological students in the widest sense of the word. It may at first be a single well-lighted room of tolerable size, furnished with some of the most necessary implements. The full apparatus and furniture may be completed hereafter. Everyone who works at the station will gladly undertake, after the completion of his investigations, to increase the original stock by the gift of the appliances which he has needed for his own labour. *The immediate need is not of apparatus, but of a place for undisturbed work*—a suitable convenient room, or, better still, a small detached cottage built for the purpose.

* See "Nature," Vol. XII., No. 304, p. 332.

I would venture to point out a site which appears to me most *suitable* for the object in view ; it is the locality in the neighbourhood of Mr. W. Macleay's Museum. The great advantages of this site are the following:—

1. The *Macleay Museum* offers an excellent general view of the Australian fauna, and that of the surrounding countries.

2. Mr. Macleay will, doubtless, not refuse the use of his rich *Zoological Library* to any working naturalist.

3. The *neighbourhood of the sea* is of great importance for the study of the marine fauna, and for the establishment of an aquarium, which will probably be set up in due time in the proposed station.

4. In Mr. Macleay the institution would find a *most competent director* ; his great zoological acquirements especially as regards the fauna of Australia, New Guinea, &c., will be of the utmost importance and utility for every naturalist who comes to Sydney, and desires to occupy himself with thorough investigations in Australian zoology ; this I can state from personal experience. His love of natural science, and the interest which he consequently takes in its advancement, which the proposed institution is *certain to develop to no small extent*, are guarantees that under his guidance and inspection the station will be maintained in a *flourishing* condition.

The conditions which I have enumerated, namely a *suitable site, close to the sea*, and in the *neighborhood of a good museum and a rich library*, together with the *important addition of a thoroughly competent director*, are such as bear me out in the assertion which I have made above, that Sydney possesses *unusual facilities* for the establishment of a *first zoological station in Australia*.

I trust that the distinguished society which I have the honor of addressing, will coincide with me in these views, and that looking upon this undertaking as one every way worthy of a scientific body they will take into consideration the best means of giving speedy effect to a plan of which the honor will belong to themselves, but the benefits will be felt and recognised by the world at large.

If the society regard the establishment of such a zoological station desirable, I shall have much pleasure in laying before its next meeting a *sketch of the building required*, together with a *brief table of rules* as to the mode in which the station shall be used.

NOTE.—A Committee of Members was appointed to consider Baron Macley's proposal, and to report thereon at the next monthly meeting of the Society.

LEPIDOPTERA having the ANTILIA terminal in a TERETRON or BOREE.

By REGINALD BLIGH READ, M.R.C.S.

Plate 14.

EARLY in the present year, (1878) the enquiry was addressed to the Microscopical Section of the Royal Society of New South Wales, on behalf of the President of the Royal Microscopical Society of London, H. T. Slack, Esq—"Whether there existed in the colony any butterflies or moths with a boring proboscis similar to those which attack the orange tree in South Australia?" which was sent on to this Society to answer. Mr. Slack's enquiry was a little puzzling, since it is the orange and not its tree which is attacked by these Lepidoptera, which are fortunately very rare in those districts adjacent to Sydney which are the chief commercial seat of the production of the orange in Australia.

The fertilisation of flowers by insects has led botanists to bestow particular attention to the arrangements whereby insects are attracted to flowers as well as those various modifications of the organs of the flower by which its cross-fertilisation may be most readily effected. In the study of the antlia of these Lepidoptera which assist in this fertilisation, the entomologist will find a large field, hitherto scarcely touched upon, and which will prove the more interesting, as it will have, probably, an important part in the future classification of Lepidoptera. In the genus which forms the subject of this paper the adaptation of the organ is of a most remarkable character.

The fullest notice of these Lepidoptera is contained in a most interesting communication by M. T. Künckel, of 30th Aug., 1875, to "Comptes Rendus," which is translated in the Annals and Magazine of Natural History, accompanied by drawings, at p. 371 of vol. XVI., for 1875.

Mr. Slack has just forwarded me a paper read by him before the Royal Microscopical Society on 6th October, 1875, on "Perforating Proboscis," in which he called attention to a short notice in April, 1874, by Mr. M'Intyre, describing the perforating proboscis of a moth said to have come from West Africa. Mr. Slack also refers to the paper by Künckel, whom he corrects in an important detail, viz., the asserted rigidity of the trunk.

Had, however, the publication been continued of Scott's "Australian Lepidoptera," notice would have been attracted as early as 1864, since in a lithograph (exhibited to the Society) prepared for Part IV by Miss Scott, the *Antlia* are figured with "serrations immediately behind the sharply pointed tip," the description given in Mr. Scott's M.SS.

The genus *Ophideres* *Boisd.*, to which the possession appears to be confined of *Antlia* whose terminal forms a teretron (*τέρετρον*, a borer, gimlet) is represented in New South Wales by two species, *O. fullonica*, and *O. Atkinsoni* (Scott. M.SS.), and as these species are also found in Queensland at Rockhampton, they are probably identical with those which attracted the notice of the French botanist, Thozet, who first drew Künckel's attention to their depredations on the Orange.

Of the specimens from which the accompanying drawings have been made, I am indebted for those of *O. fullonica*, to Wm. Macleay, Esq., whose valuable Museum at Elizabeth Bay, is of such service to students of Natural History; and for those of *O. Atkinsoni*, to the kind courtesy of Walker Scott, Esq.

In his paper, Künckel stated that *Ophideres* were exceptional to the other Lepidoptera, since they possessed a rigid trunk; in this he was in error, since the *Antlia* coil in the usual way, although the terminal portion which may be designated the teretron possesses considerable rigidity.

Although aware of Künckel's description and illustration, I was quite unprepared for the wonderful appearance the *antlia* dis-

played when placed under a power of 60 to 85 of the microscope, and it required considerable and patient attention to master the details presented. The varied appearance and wonderful display of color has made it an object of attraction to all who have seen it. Premising that the two applied maxillæ constitute the antlia, the extremity or terminal portion which forms the teretron is about one-eighth of the whole length of the antlia. The description subjoined is of the terminal of one of the maxillæ, being one-half of the teretron.

Upper and outer surface (fig. 1, 3, 4). Tip acutely pointed, expanding upwards into three barbs, two of which, the first and third, are placed on the outer side, whilst the second is intermediate between them and next the line of junction of the maxillæ. From the barbed portion the terminal begins to expand, and on its upper surface is presented in a line above the second barb a curved projection terminating abruptly, shewing a sharp oval, gouge-like edge; the interior of the projection is sharply hollowed out, and from it arises a large rounded tooth-like process. From this point commence two or more rows of thickly set setæ, which continue the whole length of the antlia. Above and on the outer side of the terminal is placed, diagonally, a second process similar to that already described, whilst above, in a line between the first and second, occurs the third. The fourth is placed above and in a line alternating between the second and third. The fifth is similarly placed in relation to the third and fourth, and the sixth and last in respect of the fourth and fifth. Each superior process is slightly larger than that below it. At the base of the sixth process, in a slightly cupped hollow, is a solitary long spine, whose office may be to prevent the teretron being plunged too deeply into fruits to permit of withdrawal.

Under surface (fig. 2). Tip acutely pointed, expanding upwards, then suddenly contracting, gives a sharp transverse ridge one-half way up the barbed portion, which again expands upwards and outwards, and forms a second sharp edged transverse ridge. The remainder of the terminal is divided unequally into three divisions, each of which presents a very strong sharp lancet-like

process. At the junction of the terminal with the remainder of the maxillæ are set diagonally upwards and outwards four conically shaped spines, then, a space intervening, there is placed higher up the maxillæ a set of three similar spines; after a longer interval a set of two spines occurs, and finally a single spine is placed at a considerable distance from the last two, making ten in all placed like the teeth of a long harrow (fig. 5).

Furnished with this extraordinary apparatus these species of *Ophideres* are able to pierce the skin of the orange even before it has turned yellow, two or three sometimes attacking the same fruit. They can also pierce the tough rind of the banana whilst still green.

It is to be hoped that this paper will lead other observers to watch the habits of these interesting Lepidoptera, and I shall be obliged for any communications respecting them, and also for fresh specimens for dissection.

Microscopical examination of numerous specimens of *Oatocala Anocala* and *Spanocala*, Scott, disclose a wonderful diversity of arrangement of papillæ and spines, so that it may probably be found advisable to arrange the Antlia of the Lepidoptera in four divisions, viz. :—

Antlia — Smooth.

Ex. *Danaïs Eriippus*.

— Partially papillate.

Ex. *Vanessa Atalanta* (?)

— Partially papillate, with spines set at intervals along the whole under surface of antlia.

Ex. *Anocala*, n. sp., Scott.

— Furnished with teretron and with spines along part of under surface of antlia.

Ex. *Ophideres fullonica* and *Atkinsoni*.

At p. 223, Vol. VIII of Nature there is a description and drawing of the proboscis of a Sphinx (♀) by Herman Müller, which proves the correctness of Darwin's assertion as to the fertilisation of *Anagœcum cesquipedale*—"there must be moths with a proboscis capable of extension to a length of between 10 and 11 inches."

EXPLANATION OF PLATE 14.

Fig. 1.—Upper surface of borer.

Fig. 2.—Under surface of borer.

Fig. 3 and 4.—Side views of same.

Fig. 5.—Arrangement of spines.

Figs. 1, 3, 4, $\times 85$. Fig., 2 $\times 60$.

Note on the tracheæ of certain Australian Ducks.

By E. P. RAMSAY, F.L.S.

In our Proceedings for the year 1877, I made some remarks on the *Anas castanea* of Eyton, our common Australian Teal, and referred to Professor Newton's remarks on the tracheæ of this species, see P.Z.S. 1871, p. 649. I was not a little surprised at the statement that a *bulla ossea* was found in the tracheæ of both sexes, having some years ago examined a considerable number of the same species without finding any *bulla ossea* in the female, but in the males it was well developed. I have recently examined six females with the same results, finding no trace of this organ in any of them, I believe therefore that Professor Newton must have been misled by the carelessness of his taxidermist.

In *Myroca australis* the *bulla ossea*, found in the males only, is of large size; in the Freckled Duck, *Stictonetta nevosa*, it is not found, either in the male or female, but the tracheæ of the male has a slight swelling about $\frac{1}{3}$ of its length from the root of the tongue, and in this enlargement the rings are divided, by a narrow slit, of which however more hereafter, when I hope to be able to offer the Society some remarks on this and other species of Australian Ducks. For the present I wish merely to correct an error into which my friend, Professor Newton, has fallen, and which I quoted in the above mentioned paper on Australian Birds.

Mollusca of the "Chevert" Expedition.

By J. BRAZIER, C.M.Z.S., Corr. M.R.S. Tas., &c., &c.

TURBO SUPRAGRANOSUS.

Trochus (Gibbula) supragranosus, Smith, Journal Linn. Society, London, Zoology, Vol. XII, p. 558, pl. XXX, fig. 15.

Hab. Barnard and Fitzroy Islands, North East Australia; Sue and Dungeness Islands, Torres Straits; Makera Harbour, San Christoval; also, Florida Island, Solomon Islands, found under stones; Percy Island No. II, North East Australia, brought up in the dredge from 18 fathoms.

Mr. Edgar A. Smith remarks that one of the chief peculiarities of this species is that the spiral liræ on the last whorl near the middle run in pairs; the lirations on the spire become granulose as the apex is approached; the brown or pinkish brown stripes which flow downwards from the suture are interrupted somewhat by the transverse sulci, and thus appear as oblong dots on the liræ. On the back of the body whorl, not far from the lip, is a large brown or pinkish brown stain. Mr. Smith places it in the family of *Trochidae*. I have examined the operculum and find it to be calcareous, therefore place it in the family *Turbinidae*. In 1865, I found it very plentiful at Florida Island; a great number of specimens were obtained at Darnley Island, in Torres Straits, (dead) at the depth of 25 to 30 fathoms; a few also were obtained at Palm Island, North East Australia, at 8 fathoms sandy mud bottom, specimens lighter in colour.

DRAWINGS BY AUSTRALIAN ABORIGINES.

By J. C. Cox, M.D., F.L.S., &c.

Plates 15 and 16.

The drawings on sheets of bark, which I have laid before the Society this evening, were obtained from the natives on Essington Island, on the north coast of Australia. The aborigines of the Australian continent appear to have been in the habit of painting

on a similar material; unfortunately, owing to the perishable nature of the bark and to the pigment used, commonly pipeclay, being easily defaced, few of these illustrations have been saved. Mr. Brough Smythe has, however, been successful in preserving some few of these relics, and has figured them in the valuable work which he has just published on the habits and customs of the natives of Victoria. I have on several occasions seen in caves, drawings of various objects made by the natives, with outlines of lizards and kangaroo, &c., these latter invariably on a small scale, and all associated with the well-known "red hand"—but I have never met with, until now, such large drawings of animals on sheets of bark, as those I now place before the Society. I have indeed seen even larger sheets of the same material, but these were ornamented by the natives with angular figures painted with red, white, and yellow clay, and a colouring matter, which is obtained from the inside of lumps of ironstone, similar to that used in former times by the aborigines to cover their bodies with. I fancy the only use made of such drawings as these must be to render their meetings more attractive when dancing before the fire in the wild gesticulations of a corroboree, or they may be drawn for amusement when confined to their caves by the inclemency of weather, certainly not made to ornament their gunya's as we, our rooms, with pictures.

Figs. 1, 2, 3, 4, 5, and 6, plate 15, are all on one sheet of bark, about 2 feet 2 inches long, and 10 inches wide.

Fig. 1, plate 15, the figure of a turtle. The body of this figure is red, and the pattern lines are white; measuring 7 inches long and 7 broad.

Fig. 2, plate 15, also the figure of a tortoise, $9\frac{1}{2}$ inches long, and 6 wide. This figure is yellow, and has defaced white lines running slantingly across it, and two more defaced lines running from the head to the tail.

Fig. 3 is yellow, outlined with a white margin, possibly intended for the figure of a man; it measures about 6 inches long. The hands of this figure are furnished with six fingers; the posterior limbs are more like the posterior ends of a seal than human legs.

Fig. 4, plate 15, the figure of a lizard. This figure is yellow edged with white, and measures about 9 inches long.

Fig. 5, plate 15, also the figure of a reptile of the lizard type, measuring $9\frac{1}{2}$ inches long. The color is red and the spots are white.

Fig. 6, plate 15, a diminutive figure of a man, 3 inches long, with extended arms and fingers; this figure is yellow and white.

Fig. 7, plate 15, the figure of a bird, like a heron; measuring 16 inches long and $5\frac{1}{2}$ inch wide, on a piece of bark by itself, 20 by 12 inches. The outline of the bird is drawn with white pipe-clay, and the feathers are represented by mixed yellow and white lines. The feet of the bird are represented with four toes each.

Figs. 8 and 9, plate 15, are frogs, on one sheet of bark, 18 inches long. Figure 8 measures 5 inches in length. The groundwork of this figure is white, outlined with red.

Fig. 9, plate 15, is $13\frac{1}{2}$ inches long; the groundwork white, the outlines and sculptured markings are red. The animal is depicted with five toes on each limb; the eyes are very prominent, and it is furnished with genital appendages.

Fig. 10, plate 15, is on a sheet of bark by itself, about 4 feet long. I can only suppose this figure to represent the skin of a man. The figure is 2 feet 9 inches long and 1 foot wide; the figure is white, and the outlines and pattern marks and cross lines and spots are red; there are six fingers on each hand, and six toes on each foot; the legs are folded back from the knee; the head is represented by a triangular shaped figure, possibly to illustrate the skin taken from the back of the head. This figure is also with genital appendages.

Another figure of a Lizard.—Not represented in the plate, on a separate sheet of bark, has the body 14 inches long and 4 broad at the middle, but one inch broader at the posterior than at the anterior extremity. The head is spindle-shaped, slightly curved to the left, truncated at the apex, and has an ornamental serrated crest of white and yellow running from above downwards for about the middle half. The head is joined to the body by a comparatively short slender neck, 3 inches long, and from either side of the base of the neck a

front limb or arm is attached, sloping backwards, bearing a large broad five fingered hand; the arm proper is only one inch long, and the wrist, hand and fingers are four inches long, and the arm is separated from the hand by three transverse yellow lines. The posterior end of the body terminates in a tail 13 inches long, bent towards the left, bluntly tapered to the extremity, and serrated on either side with white and yellow for about two-thirds the length. Where the tail joins the body, a posterior limb is attached, sloping backwards, and measuring to the tips of the five toes, eight inches; the foot is separated, as in the front limb at the wrist, from the leg by three cross yellow lines. The figure is painted throughout with white pipeclay, and is margined at all parts with a yellow line also of coloured clay. This figure is on the inside of a sheet of bark 5 feet long.

Fig. 11, plate 15, is the representation of a tortoise, $18\frac{1}{2}$ inches long and $5\frac{1}{2}$ inches wide, on a separate sheet of bark, 2 feet 6 inches long. The groundwork of the figure is white; the outline red, and is profusely ornamented with coloured spots and cross bars.

Fig. 12, plate 16. The figure of a large reptile of the lizard tribe by itself, on a sheet of bark 3 feet 6 inches long; the figure measures 3 feet 2 inches, and is three inches wide in the middle; the body, tail, and legs are white, edged with red; the diamond-shaped pattern on the body is depicted with red lines; down the centre of the body a red line runs from the neck to the base of the tail, which is dotted with yellow; the ground colour of the head is red, and the fringe is yellow; the transverse lines at the junction of the head with the body, and the cross-pattern, are red. The front limbs, which are represented as articulated at the neck, are small, white, and edged with red; they have a proportionally very large hand and five long fingers, there are two transverse red lines at the wrist. The posterior limbs are larger than the anterior, painted in the same style, one has five fingers, one four. There is a broad red band across the base of the body, and another where the arms are articulated, and one where the tail joins it. The tail is long, tapering, white, lined with red, bent to the right, and has a fringe of

yellow on the convex surface. The narrow band of red across the lower part of the body has along the lower edge of it a row of yellow spots.

Figs. 13, 14 and 15, plate 16, are all on one sheet of bark, 2 feet 3 inches long. Fig. 13 is probably that of the *Ornithorhynchus*, or else a large sleepy lizard. It is 14 inches long and 3 wide. The figure is white, the margin of which is lined with red.

Fig. 14 is a turtle, 12 inches long and 8 wide; the ground colour is white and the transverse markings and patch of spots down the centre of the back are yellow and red.

Fig. 15 is the figure of a frog, about 10 inches long; the colour is white and faintly lined with red on the body. There are five fingers represented on each of the arms; on one of the legs there are a crowd of toes represented, while the other only has four.

Fig. 16, plate 16. The figure of a long necked tortoise, on a sheet of bark by itself; the groundwork of the figure is white, and the body is ornamented throughout with curved and transverse red and yellow lines; the neck is represented bent, very long, and ornamented with longitudinal red and yellow lines; the head is small, with eyes, represented by two red spots; the limbs are ornamented with a series of irregular transverse and cross red and yellow lines. The length of the sheet of bark on which this figure is drawn is 2 feet 6 inches long and 12 inches broad; the figure itself is 1 foot 6 inches long and $6\frac{1}{2}$ inches wide.

Fig. 17, plate 16. The representation of a bird—I presume that of a cassowary. It is on a sheet of bark, 14 inches wide by two feet long; the height of the figure is 1 foot 4 inches, and the width from the head to the tail 12 inches. The figure is white, margined by a thick red line; the space between the legs is yellow; the eye and mouth are drawn as by one long rather broad red line; another oval red patch represents the craw, and a smaller one the anus; there are also two rounded spots of red at the knee joints, and a broad long patch from the knee to the foot.

Fig. 18, plate 16. The most elaborate of all the drawings figured is that of a dugong, on a piece of bark, $2\frac{1}{2}$ feet long; the figure is white, ornamented with yellow lines, and blue and yellow patches, and blue and yellow spots, which are generally in regular rows; the body is broadly spindle-shaped; the head is wedge-shaped the broad end of the wedge being upwards; there are two flappers attached to the body just below the junction of the head with the body, and a large V shaped tail; the eyes are represented by two semi-lunate yellow patches, one on each side of the head; the dark wedge-shaped patch shown in the figure covering the upper end of the body, and stretching up over the neck in a point towards the head is dark blue, so also are the three lines on the front part of the head; the spots on the head are blue, while those on the flappers are yellow; the three zig-zag lines down the back are yellow, and the spaces enclosed by them; the spots outside the lines, on the sides of the body are blue; the spots round the edge of the body and tail are yellow, but the larger spots on the hinder part of the body and on the tail are blue. The length of the figure is $16\frac{1}{2}$ inches, and the body is almost 5 inches at its widest part.

EXHIBITS.

Mr. Brazier, C.M.Z.S., exhibited rare specimens of shells collected by Mr. F. L. Button, of Arkland, California, namely, *Muchera patula*, from Oregon, *Mya hemphilli*, *Schizotharus Huttalli*, *Pecten monotimeris*, *P. æquisulcatus*, from North California, *P. hastatus* (very rare) from Puget Sound, Washington Territory, *Helix Carpenteri* (very rare) from Coronados Island, 32° North latitude, *H. facta*, Santa Barbara Island, south coast of California.

The President, Mr. W. J. Stephens, M.A., said he was desirous to give as much publicity as possible to an attempt now being made by the Rev. T. C. Atkin, of Campbelltown, to introduce the study of practical botany among the young people of his

district. He has published and circulated a small handbook of directions for the formation of a *Hortus Siccus*, which, it is hoped, will prove of considerable service; and if the attempt should prove as successful as it is praiseworthy, it is probable that a great increase of information as to the geographical distribution and limits of the flora of New South Wales would result. It is in any case a step in the direction of the establishment of local museums of Natural History in the widest sense of the word, in which the Physiography, to use Huxley's term, of each district might be so illustrated by specimens, maps, etc., that both residents and visitors might obtain all existing information as to its distinguishing characteristics.

MONDAY, 30TH SEPTEMBER, 1878.

The President, W. J. STEPHENS, Esq., M.A., in the Chair.

DONATIONS.

From the Museum of Comparative Zoology, Harvard College, Cambridge, Mass.:—Annual Report, 1876.

From Boston Society of Natural History:—Proceedings: Vol. XIX: Parts 1 and 2.

From G. Masters, Esq.:—Catalogue of the described *Coleoptera*, of Australia, by the Donor.

The Committee appointed to consider Baron Miklucho-Maclay's suggestion for the establishment of a Zoological Station near Sydney, presented the following Report, which was read and adopted.

THE Committee of the Linnean Society of New South Wales appointed at the Monthly Meeting of the Society on August 26th, 1878, to report upon Baron Maclay's proposal for the establishment of a Zoological Station in Sydney, are of opinion—

- 1.—That Baron Macleay's proposal is an excellent one, and that it is most desirable that it should be acted upon with the least possible delay.
- 2.—That the site for the Station suggested by Baron Macleay is, from its vicinity to the sea, and the facilities afforded to the student by ready access to Mr. Macleay's Museum and Library, very well adapted for the purpose, and they recommend that an effort be made to secure it for the Society.
- 3.—That the amount required for the erection of workshops, &c., according to the plans submitted by Baron Macleay should be obtained by voluntary contributions from the members of the Society and others.
- 4.—That, as some time must elapse before the site indicated, or any other suitable one, can be secured, Mr. Macleay's offer, here following, of a temporary Station in the immediate vicinity of his Museum be accepted.

I think it so desirable that Baron Macleay's proposal should be carried out quickly, and that we should be able to announce at once to the scientific world that a Zoological Station is actually in existence in Sydney, that I offer to guarantee, until final arrangements are concluded, to find ample room either in or near my Museum for any visitors to this country who wish to undertake the study and investigation of any branch of Natural Science. And I further guarantee that such students shall have free access to, and the use of, my Museum, Library and Microscopes. This engagement on my part is limited, of course, to the bona fide student, and does not apply to the mere collector, whether amateur or professional.

(Signed) WILLIAM MACLEAY.

26th September, 1878.

- 5.—That the sketch plan laid before the Committee by Baron Macleay sufficiently meets the requirements of the Station, and should be at least provisionally adopted by the Society.

- 6.—The Committee further recommend that the annexed table of Rules, proposed by Baron Maclay, should be adopted for the general conduct of the Station.
 - 7.—That this Report be presented to the Society at the next Monthly Meeting.
-

RULES OF THE SYDNEY ZOOLOGICAL STATION.

- 1.—The Sydney Zoological Station is instituted in order to advance Biological Science, by affording Naturalists special opportunities for the investigation of the Zoology and Botany of Australia.
 - 2.—It shall be open, at the discretion of the Directors, to all Naturalists of the male sex, without distinction of nationality, it being understood that gentlemen engaged in original research have a prior claim to those who are only in training.
 - 3.—That foreign Naturalists visiting Sydney for the purpose of scientific enquiry shall in like manner have the preference over residents.
 - 4.—The use of the Station shall be given free of any charge for rent, but a fee of Five Shillings per week shall be paid by each tenant in order to meet the expense of service. And all damage done to books or appliances shall be made good by the person during whose tenure the mischief was done.
 - 5.—No tenant shall disturb any other by singing, whistling, or any other unnecessary noise.
 - 6.—A book shall be kept in the Station in which persons using the Station may record such notes or suggestions as they may think fit.
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PAPERS READ.

On a New Ganoid Fish from Queensland.

By COUNT F. DE CASTELNAU.

Plate 19 A.

I have received from Mr. Staiger of the Brisbane Museum a drawing of a very remarkable fish, with the following note :—" It is only found in a single water hole in the Burnett River, living together with *Ceratodus* ; and when in August, 1872, I was in Gayndah, I got it on the breakfast table, brought in by blacks from a distance of about eight to ten miles. I had the fish for breakfast, remarked its curious shape, and asked the then Road Inspector to draw it for me, which he did. *Ceratodus*, not well known then, formed the dinner. I was not connected with any scientific body, otherwise I would have, at any rate, preserved the head. The person who drew it is not an ichthyologist but still is a draughtsman."

On examining the rough and incomplete sketch, I saw immediately that the fish was a *ganoid* nearly allied to *Atractosteus* but forming, by its dorsal, caudal and anal fins, all united, the type of a new genus, and probably of a new family.

It is remarkable that all the species of *ganoid* fishes known, having a long, more or less, crocodile back, are until now, only from America. It is evident that from such a drawing no correct description can be given ; all I can say is that it shows the existence in Australia of a *ganoid* fish with a very elongate and very depressed spatuli-form snout ; this is much narrower at its base than towards the two-thirds of its length ; it is rounded and bordered at its extremity, having very much the form of the beak of the *Platypus*, the two jaws are of about equal length ; the eye very small and placed near the upper part of the head ; the body is covered with large *ganoid* scales ; the pectorals appear small, and are placed immediately behind and below the head ; the vertical fins are very long and united, but notwithstanding, the caudal seems rather distinct ; nothing is said of the dentition. Mr. Staiger says also that the fish is of a dirty mahogany color ; and he adds that "*the first of the four rays is very strong ;*" but

I cannot find out to what this applies. The specimen was about eighteen inches long. As I have already said, the fish that comes the nearest to it is the *Atractosteus spatula* of Lacepede; much better figured by Aug. Dumins in his *Histoire Naturelle des Poissons*, vol. II., p. 361, pl. 24, fig. 7.

In our present knowledge of this singular fish, some inconvenience might arise from giving it a significant name; and I think it is preferable to design it under the mysterious historical one of *Ompaz*. The species will bear the name of *spatuloides*.

It is much to be desired that some specimens will soon be found and secured for one of the Australian Museums.

Ompaz, by its extraordinary snout, comes also near *Polyodon*, of which one species is found in the Mississippi, and another in the great Chinese river, the Yantsekiang; but these have their body naked, and cannot properly be placed with the *ganoids*.

It is singular, but almost certain, that the teeth of *Polyodon* fall before the fish acquires its full size.

On a species of AMPHISILE from the Palau Islands.

By WILLIAM MACLEAY, F.L.S., &c.

Plate 19 B.

The very remarkable fish described in this paper, and figured on plate 19 B, was taken by Baron Macleay at a place named "Komis" near the village of "Maleggiok" on the Island of "Babelstaub" one of the Palau Archipelago.

It is found abundantly on the sandy beaches of that island at low tide, but does not seem to be used by the natives for any purpose but that of ornament in their houses.

The specimen from which the description and drawing are taken, is dry, but I believe it is not changed to any great degree from what it was in a fresh condition.

The fish belongs to the curious family of *Centriscidae*, and in the form and structure of the head resembles much the *Fistulariidae* or Pipe Fishes.

The genus *Amphisila*, to which this species belongs, is especially remarkable for a strong bony cuirass covering the entire back and extending beyond the tail; turning the hinder part of the trunk and the tail downwards in an almost vertical direction, thus making the dorsal fins appear to be on the lower surface of the tail.

At Baron Macley's request I give the species from the locality of its capture, the name of

AMPHISILE KOMIS.

General form elongate, very compressed, tapering in front to the extremity of the snout, and behind to the 1st dorsal spine, swelling out in the middle both above and below in a very gentle curve and slightly curving upwards at each extremity. The width is greatest along the middle of the sides where there is a ridge, represented in the vertical section—fig. a. b. The snout from the eye is twice as long as the height of the body at its deepest part, and one-fourth of the total length from the mouth to the extremity of the 1st dorsal spine, it is compressed, tapers to a very minute mouth, and excepting towards the eye where it is of the same bony punctato-striate substance as the crown of the head, its integuments are transparent. The nostrils are immediately in front of the eyes, the anterior one rather large. The orbits are rather large and about their diameter apart with a distinct ridge round them, and a short ridge in front, extending from near the nostril downwards. The upper part of the head is hard and punctato-striate, and may be looked upon as a mere continuation of the body cuirass—this bony part commences in a very narrow strip near the mouth, and extends along the summit of the snout, gradually widening until it joins the first dorsal plate. On the vertex between the eyes there is a very slight longitudinal depression. Below the eye a blunt spine or process extends downwards into the transparent ventral membrane.

The operculum is scarcely longer than high, convex, punctate, rounded behind, and angular beneath, the distance of its posterior margin from the root of the pectoral fin being much greater than its distance from the anterior margin of the orbit.

The humerus is large and of somewhat triangular shape, the posterior angle extending to the upper part of the origin of the pectoral fin, while beneath on the anterior portion there is a broad notch to receive the upper part of the coracoid bone. This bone is nearly square, with an oblique groove in the middle.

The dorsal cuirass extends on the back from the head, to which it is firmly fixed, the suture being rigid and dovetailed, in one apparent piece (*) to about one-fifth the entire length of the fish beyond the tail; it becomes gradually smaller towards the extremity, and has articulated to its apex, running in the same direction a spine of about half an inch in length, to which I give the name of the first dorsal spine.

The whole of this part of the cuirass is longitudinally striate, and for the most part punctate. The lateral portion of the cuirass seems to consist of four plates, closely adherent to the dorsal part just mentioned, (the suture being scarcely visible) and extending downwards along the middle of the body as far as the middle of the sides. The first plate is narrow from its contact with the head and operculum, until past the humerus and pectoral fin, where it expands downwards to the middle of the body; the second plate is shorter than the first, rather longer than deep, and quite rectangular; the third is about the same length as the second, but becomes less deep towards the fourth; this last runs out entirely into the dorsal portion above the tail. The lateral sutures of these plates are deeply serrated, the serrations dovetailing in the most perfect way. These lateral plates, or at least three of them, have a fan-shaped series of fine striae, expanding downwards from a nucleus near the dorsal suture. The body below these lateral plates is covered with a perfectly transparent membrane, through which ten pairs of ribs are visible, and terminates beneath in a very trenchant edge which extends from the snout to the vent.

The pectoral fins are of moderate size, situated much nearer to the ventral fin than to the eyes, and consist of eleven rays of nearly uniform length. The ventral fin, for there is only one, is

* Dr. Gunther, in his description of *A. scutata*, speaks of this part as consisting of five bones.

abdominal, taking its rise in a deep notch of the sharp ventral edge, about opposite the middle of the second plate of the cuirass, much nearer to the anal fin than to the eye, and consists of four rays, the two longest quite four lines in length. The other fins are close together, and much of a size, the anal consisting of ten rays, about the length of those of the ventral; the caudal in the same plane on a tail pointing downwards, and only a little free from the body, of ten rays. The soft dorsal close behind and in the same plane, of ten rays, gradually lengthening backwards, or towards the first rays, according to the method of reckoning in fishes of normal form.

The spinous dorsal consists, in addition to the articulated continuation of the dorsal cuirass already mentioned, of a short strong spine pointing downwards and backwards from the under side of the extremity of the dorsal cuirass, and connected by a very small membrane with the first spine, and of two others, considerably larger and near the soft dorsal, of a slightly curved and flattened shape and unequal size: the one nearest the soft dorsal being the smallest, connected together by a membrane to the apex, and also connected by a long but low membrane with the second spine.

The color seems to have been yellowish or yellowish brown for the most part, on the hard parts, all the rest seems to have been transparent; the dark mark along the middle of the body is probably due to the course of the alimentary canal showing through the integuments.

The length of the fish is five inches, the figure given in plate 19B being the exact dimensions, and I believe it is the full adult size. The specimen I suppose to be a male, as in another species, Kner seems to have found the prolongation of two rays in the ventral fin, an indication of the sex.

Three species of *Amphisila* are recorded in Dr. Gunther's admirable Catalogue of Fishes. *A. scutata*, *punctulata*, and *strigata*; of these, the last, a species described and named by that distinguished Ichthyologist himself is the only one which can be suspected of being identical with the present species. But the differences are many and important. The following are some of

the main points of difference. The interorbital space has a slight longitudinal groove, the operculum is not longer than deep, and has an angular protuberance beneath, the distance from the posterior margin of the operculum to the root of the pectoral is much greater than to the anterior margin of the orbit, there is no black longitudinal band, and the lateral plates of the cuirass differ both in size and number. According to my estimate also there is a considerable difference in the formula of the fins, that of *A. strigata* Gunth. being D. $\frac{3}{10}$, A. 12, C. 10, P. 12, V. 4, while that of the present species is D. $\frac{4}{10}$, A. 10, C. 10, P. 11, V. 4.

ON MACRODONTISM.

By N. DE MIKLUCHO-MACLAY, Hon. Memb. Linn. Soc. N. S. W.

Plate 18.

The copy in "Nature" (Vol. XVI., No. 404) of the sketch of an Islander of Taui*, which I had sent in 1876 to Professor R. Virchow in Berlin, is such a perfect caricature that I am induced, in consideration of the great anthropological interest of the subject, to lay before the Society a correct lithograph of my original sketch, with some remarks on this peculiarity, which I shall call *Macrodontism* (μακροδοντισμός).

I commence with an extract from my first letter on this subject to Professor Virchow, which has been kindly translated into English by Mr. C. L. Sahl, Imperial German Consul in Sydney.

"15 June, 1876.

"Archipelago Ninigo (or Eohiquier),

"1° 23' south lat., 144 east long.

"Going south after my visit to Western Mikronesia, I came to the Admiralty Islands, which are as yet little known. I continued there my anthropological studies, and devoted my attention to an important anatomical peculiarity of the natives (who belong to the Melanesian Race) and obtained some unexpected

* Taui or Admiralty Islands.

results. I observed a considerable irregularity of the teeth, which are mostly very protruding, and I soon found out that it was owing to the enormous size of those of the front row. The sketch herewith shows certain parts of the mouth in its natural size. Generally it was the incisors of the upper jaw which were enlarged, but sometimes those of the lower jaw showed the same peculiarity; in some individuals the canine teeth seemed also enlarged. The teeth were thick in proportion, and as seen from above (or from below) they formed a sort of grinding surface, which sometimes even was tuberculate.

"These people had a great aversion to my measuring their teeth or making a drawing of them, some of them I persuaded through presents, others through surprise, where their astonishment and perhaps fear left them without defence in my hands; but only for a short time; they missed no opportunity to escape, and showed such an impatience that the measuring and drawing were made very difficult. Wherever I could I lost no opportunity to measure as exactly as possible, but I regret that my examination could not be a complete one. I have added the measurements to my sketches, but must observe that I had not the opportunity of sketching the most characteristic individuals; I had to content myself with the good natured and timid ones; some very magnificent representatives of these large-teethed people (of whom I observed several dozen on the Admiralty Islands, and on the Island of Agomes or Hermit Island) refused very decidedly to have their teeth sketched or even measured.

"To some of these people, whose large teeth were quite loose and could easily have been extracted with little pain, I offered one and even two axes for one big tooth; but even the desire to obtain the axes was not strong enough against the firm superstition that in that case the person would die.

"Later on I succeeded at the Island of Agomes in obtaining a piece of a big tooth from a man, who, having no big teeth of his own, very likely was selling that of a relation.

"These large-teethed people do not form a distinct tribe, they are to be found distributed amongst the population. Some are, indeed, magnificent specimens; I have measured some incisor

teeth with a crown of 22 m.m. length, others also of incisors 19 m.m. breadth, the thickness of some of these was not less than 11 m.m.

"On account of the continuous chewing of betel and penang,† the enamel of the teeth is covered with a black crust. In some instances when the mouth was closed the teeth protruded between the lips.

"I have not only met men with such teeth, but women as well, but more seldom. The teeth of some of the boys promised in time not to be behind in size those of their older countrymen.

"So far, I have found these large-teethed Melanesians only on the Admiralty Islands (on the south and north-west) and on the Island of Agomes.

"When I saw these people with protruding teeth around me I was reminded of the *Orang Gargassi* of the Malayan Peninsula,‡ and thought involuntarily of the hypotheses, theories, etc., etc., which would have been the result if a piece of skull with these enormous teeth had been found in any recent geological formation."

Since this letter I have sent two fuller reports to Europe about "Macrodontism," one to the Imperial Russian Geographical Society in St. Petersburg; and a second, with a number of sketches of different sets of teeth of Islanders of Tani and Agomes, to the President of the Anthropological Society of Berlin. Those who interest themselves especially in these anatomical specialities I refer to these reports. I will only add here, that my attention being roused by the observation of the large teeth of the Admiralty Islanders, I lost no opportunity to observe the teeth of all the different races of people that I subsequently during my travels came in contact with. I then convinced myself that "Macrodontism" occurs to a certain extent with *other* races, though I observed nowhere such remarkably big teethed people, and such numerous instances of this peculiarity, as on the Islands of Tani and Agomes.

† It is not improbable that other vegetable material, which we do not as yet know, is also used for chewing by the inhabitants of Tani.

‡ In many places of the Malay Peninsula I have heard of the existence of curly-haired people with two *protruding teeth*, and these *Orang Gargassi*, as they were called, are supposed to live in the mountains between Kedah and Singoro.

During my second stay (1876-77) on the *Maclay-Coast of New Guinea* I found several individuals who had some teeth of abnormal size, and which, like those on Tauí and Agomes, presented no pathological condition. I met three or four of such people amongst the inhabitants of the archipelago of the "Content men," also in some of the mountain villages of the *Maclay-Coast*. In *Zamboanga* on the S.W. point of the Island *Mindunao* (in Jany., 1878), I met a native (whose ancestors, as he informed me, were Bugis) whose teeth of considerable size were very remarkable.

In 1878 I saw in *Singapore* a Chinese Coolie in the street, whose large teeth were well shown by his hearty laugh, and which attracted my attention. Owing to my illness I was prevented from sketching or measuring this specimen.

Amongst my older notes I found a memo. that in 1873, on the Island *Tidore*, I saw a Malay with remarkably large teeth; in the same year (1873) I also saw a Chinese in *Canton* with very large teeth.

In conclusion, I will remark that the opinion which I have formed (and which I have communicated in my second report to the Imperial Geographical Society of Russia in 1876) is that Macrodonatism (or hypertrophy of the dentinum) should rank in the same category as the elongation of the nymphæ, and the accumulation of fat about the buttocks and sacrum in the Hottentot woman, and in a similar manner as this peculiarity of constitution, Macrodonatism is not to be met amongst *all* individuals.

That this Hypertrophy of the Dentinum stands in close relation with the food is without doubt; but during my comparatively short stay in the islands I could not discover the particular diet which causes this anomaly, or might have caused it, as it is certain that the peculiarity is hereditary.

EXPLANATION OF PLATE 18.

(1) Sketch of the laughing *Soyan* ♂ about 25 years old, an inhabitant of the village of Pubi, on the south-east coast of the

large island of the Tauti Group. In his fine curly hair (*chevelure à grain de poivre*) is worn a roughly cut wooden comb. In a small artistically netted satchel around his neck is seen the *Ovum Ovulum*, frequently the only dress of the men (*lanquam glandis scutellum*).

(2) Half-opened mouth of the same, in profile and natural size (measured very carefully). The cartilage of the nose is pierced.

(3) Mouth of the same, *en face*, $\frac{1}{4}$ natural size.

(4) Middle incisor teeth of the same man, carefully measured.

(5) One of the large incisors of another man from the same village.

On the GOSHAWK from Port Moresby, *Astur cruentus* of Salvadori and Sharpe (*nec* Gould).

By E. P. RAMSAY, F.L.S., &c.

ASTUR SHARPEI, *sp. nov.*

Astur cruentus, *Salvad.* (*nec* Gould) *Ann. Mus. civic. Genov.* VII. p. 806; *Urospizias cruentus*, *id. op. cit.* IX. p. 11., *Astur cruentus*, *Sharpe* (*nec* Gould), *Journ. Linn. Soc. Zool.* XIII. p. 488., (*Descrip.*).

In the Journal of Linnean Society,—Zool. XIII. p. 488—Mr. R. B. Sharpe refers to the Port Moresby Goshawk, as *Astur cruentus*, of Mr. Gould, thereby making it identical with the Western Australian species. Mr. Sharpe gives a very good description of the bird, but does not appear to notice the difference in the tarsi and the *extent of the bare portion*, which in the West Australian bird is quite as long as in *A. approximans*, but in the Port Moresby bird, *very much shorter*—with respect to the rufous collar, I have N. S. W. specimens of *A. approximans* which have a quite as well defined rufous band round the neck, as in any of the West Australian or Port Moresby birds—but these latter are shorter and heavier-built birds, and have comparatively shorter tarsi, and the bare portion shorter, equal to about one-third of its total length, the toes are shorter and the feet smaller and weaker.

In the fully adult birds, the centre two tail feathers loose all bars, or have them only slightly perceptible in certain lights.

The back is of a clearer dark grey color, and the whole of the under surface, which is narrowly barred, is of a rich tawny rufous; the feathers on the abdomen and under-tail coverts are ashy-white barred with rufous.

An examination of Mr. Gould's plate of *A. cruentus* (Bds. Aust. fol., vol. I., pl. 18), will at once show that it is certainly not the same as the Port Moresby Goshawk; in fact, I am very much afraid it is nothing more than *Astur approximans* in full plumage. I have examined a large series from Western Australia, both young and adults of both sexes and have birds exactly agreeing with Mr. Gould's figure of *A. cruentus*. The only perceptible difference in any of them is, that in some of the immature birds the tail is of a slightly more square form than in those from N.S.W. Mr. Gould states that *A. cruentus* is very common in West. Australia—it is the common Goshawk of those parts; and it would be curious indeed if so common a bird should not have been obtained since Mr. Gould acquired his types. I should have thought ere this that some of our Ornithologists in England or America would have examined the type specimen if it is still in existence, and so set the matter at rest.

For the Port Moresby bird then, which is certainly not the *Astur cruentus* of Mr. Gould. I propose the name of *Astur sharpei*, in honor of my esteemed correspondent, R. B. Sharpe, Esq., F.L.S., F.Z.S., &c.

For the benefit of Australian ornithologists who may not have the Works above cited, I give here a short diagnosis of this species.

Adult.—Side of the head and all the upper surface except the collar, rich dark bluish ashy-grey, feathers of the nape white at the base, ashy-grey towards the end, and becoming rich tawny-red on the hind neck which color forms a broad collar joining the sides of the chest; throat ashy, with minute wavy transverse lines of whitish; chest and breast and all the under surface rich tawny rufous barred with transverse wavy lines of ashy-grey; the base of the feathers on the abdomen and under tail coverts whitish, the

remaining part barred alternately with ash and rufous cross-bars; thighs, light tawny rufous with narrow bars of ashy; tarsi clothed to one-third of their length; tail, light-ashy below, bluish-ashy grey above, with indistinct bars, obsolete in centre two feathers; the margins of the inner webs towards the base washed with tawny; bill, black; cere, legs, and feet, greenish-yellow—(dry skin); iris, yellow. Total length 15·5 in.; wing, 10 in.; tail, 8·5 in.; tarsus, 2·6 in. Sex, female. The male is precisely similar in plumage, slightly smaller in measurements. I find in all our specimens that on the centre and outer-tail feathers, the bars have faded out, but on the third and fourth on either side, the bars are tolerably distinct.

Descriptions of Australian MICRO-LEPIDOPTERA.

By E. MEYRICK, Esq., B.A.

I CRAMBITES.

It is somewhat surprising that no progress should yet have been made towards the knowledge of *Micro-Lepidoptera* in a country which so abounds with the groups included under that term as Australia does. In general, the small size and delicate nature of the specimens preclude them from being commonly sent home to England by travelling collectors; but they offer a wide field for the study of resident entomologists. According to the very imperfect data at present possessed, I estimate the total number of species occurring on the Australian continent to be fully 10,000, as they much exceed the larger *Lepidoptera* here in number and variety. It is to be hoped, therefore, that, when once a start has been made, entomologists will begin to take some interest in the subject; and it may not be out of place to state that I shall always be ready to determine to the best of my ability any species that may be entrusted to my care, and that it would be of great interest to receive collections even of the commoner kinds from various parts of the country.

A certain number of descriptions of Australian *Micros* were included by Walker in his British Museum Catalogues; these names I have of course adopted when recognisable, but the

descriptions are commonly very incomplete, the determination of genera utterly unreliable and frequently erroneous, and the original specimens often so scanty and mutilated as to be quite unfit for description; whilst others, even the most conspicuous species, are described under several different names. Besides these, there are only a very few scattered descriptions by Zeller, Newman, &c.

Of the species hereafter described, some of the *Crambidae* have been named both by Zeller and Walker, since Zeller regarded Walker's descriptions as generally unidentifiable; the *Crambi* are, however, generally recognisable, and his names should, therefore, be adopted. Walker has also described certain Australian insects as belonging to various genera in the *Phycidæ*; but I can certify from inspection of the types that hardly any, or perhaps none, are true *Phycidæ*, but *Pyrales*, *Deltoidea*, and even small *Noctuae*.

With reference to the localities and dates here appended to the species, it should be observed that, although correct so far as they go, they must not be considered as necessarily at all completely expressing the facts, on account of the very limited data accessible at present.

CHILONIDÆ.

SCHOENOBIVS Dup.

Ocelli distinct. Tongue short. Antennæ setaceous, in ♂ longer, ciliated, in ♀ very short. Labial palpi very long, straight, attenuated. Maxillary palpi triangular, appressed to labial palpi. Wings elongate, apex of hind wings reaching beyond anal angle of fore wings; in ♀ fore wings narrower and more acute than in ♂. Anal tuft of ♀ dense, woolly.

Schoen. imparcellus n. sp.

♂ $9\frac{1}{2}$ "— $12\frac{1}{2}$ ". Head brownish-ochreous. Labial palpi more than twice as long as head, from brownish-ochreous to dark-fuscons. Antennæ brownish-ochreous or dark-fuscons, strongly ciliated. Thorax brownish-ochreous to blackish-brown. Abdomen pale greyish-ochreous, sometimes suffused with fuscons, whitish at base. Anterior legs dark fuscons; middle and posterior legs

whitish or whitish-ochreous. Fore wings tolerably broad, moderately dilated, hind margin strongly rounded beneath; varying from brownish-ochreous to dark fuscous, darkest along costa; markings very variable or obsolete; generally a small dark fuscous or blackish discal spot at two-thirds; sometimes another obliquely above it near costa, and a third obliquely below it on fold; in the most distinctly-marked specimens there are two transverse cloudy blackish-fuscous lines, the first from two-fifths of costa to two-fifths of inner margin, strongly angulated outwards above middle; the second rising from costa before apex, curving round and running to the median discal spot, thence continued to the inner margin parallel to the first; these lines are generally obsolete or absent; a row of blackish spots on hind margin; cilia greyish-ochreous. Hind wings pure white, towards apex more or less suffused with smoky fuscous; cilia white, smoky towards apex of wing.

♀ 14"—17". Head, palpi, antennæ, thorax, abdomen, and legs white; palpi little longer than head; anal tuft whitish-ochreous; posterior tarsi externally fuscous-grey. Fore wings elongate, tolerably broad, hind margin nearly straight, obliquely rounded beneath; satiny-white, sometimes more or less strongly suffused throughout with whitish-ochreous; cilia white. Hind wings and cilia pure satiny-white.

Extremely variable; the ♂ somewhat resembling *gigantellus* ♂, but darker, the ♀ very distinct.

Very common at Parramatta in February and March on the river, the ♀ resting motionless on rushes, the ♂ more active; both come freely to light. The larva feeds in the cylindrical stem-like leaves of *Juncus prismatocarpus*, growing in the water.

CHILO Zk.

Ocelli present. Tongue short. Antennæ setaceous, pubescent, in ♀ hardly shorter than in ♂. Labial palpi very long, straight, porrected, attenuated. Maxillary palpi triangular, appressed. Wings elongate, apex of hind wings reaching beyond anal angle of fore wings. Hind wings with a basal pecten. Abdomen in ♂ somewhat tufted, in ♀ compressed-conical, with apical scales obliquely truncate.

Chil. parramattellus n. sp.

♂ 9"—14". Head white. Palpi whitish-ochreous, mixed with greyish-fuscons. Antennæ ochreous-whitish. Thorax ochreous-whitish, sometimes thinly sprinkled with fuscons. Abdomen white, sometimes tinged with ochreous-grey, anal tuft pale ochreous-grey. Legs whitish, posterior tarsi sometimes with dark grey rings. Fore wings moderately broad, costa nearly straight, apex tolerably acute, hind margin nearly straight, slightly oblique; whitish-ochreous, more or less densely irrorated with fuscons-grey in variable intensity; extreme costal edge whitish, only distinct in dark specimens; a dark fuscons discal dot slightly beyond middle of wing, very much nearer to costa than to inner margin; sometimes on the whitish costal margin are indications of the commencement of transverse lines at one-third and two-thirds, but they are imperceptible on the disc; cilia whitish-ochreous to ochreous-grey. Hind wings white, with a dark grey marginal line, sometimes suffused with greyish posteriorly; cilia whitish-grey, white at base.

♀ 10"—12". Head whitish. Palpi whitish-ochreous, mixed with greyish and dark fuscons scales. Antennæ whitish. Thorax whitish-ochreous, sometimes ochreous-brown on sides. Abdomen white, sometimes partially tinged with ochreous; ovipositor short, triangular. Anterior legs whitish; middle and posterior legs pale greyish-ochreous. Fore wings much narrower than in ♂, apex more sharply acute, hind margin straighter and more oblique; whitish-ochreous, the veins neatly outlined on each side with darker-ochreous; a small black discal dot beyond middle of wing, nearer to costa than to inner margin; a hind-marginal row of clear black dots; cilia whitish, with two grey parting-lines. Hind wings clear white; cilia white.

Apparently allied to the South American species *O. neuricellus* Z. and *obliteratellus* Z.

Common at Parramatta along the river in February and March, especially at light.

CRAMBIDÆ.

PRIONOPHORA *n.g.*

Forehead with overhanging projection of scales. Ocelli distinct, behind antennæ. Tongue moderate. Antennæ moderate, in ♂ ciliated. Labial palpi moderately long, rather shorter than thorax, porrected, attenuated. Maxillary palpi absent. Forewings oblong, apex projecting, acute, hindmargin strongly concave beneath apex, dentate throughout. Hindwings with basal pecten, apex not reaching anal angle of forewings, hindmargin subdentate, with a deeper indentation a little below apex; clothed with long hair-scales towards base. Legs short. Abdomen moderate. Forewings with 12 veins; 8 and 9 stalked, rising out of 7. Hindwings with 8 veins; cell open posteriorly.

Readily distinguished amongst allied genera by the absence of maxillary palpi, the peculiarly produced apex of forewings, and the hair-scales towards base of hindwings.

Prion. ruptella Wkr. Cat. 173 (*Crambus*).

11"—14". Head light ochreous, posteriorly whitish, with a few blackish scales, sometimes forming a central blackish line. Palpi whitish-ochreous, sprinkled with blackish scales, beneath white at base. Antennæ pale ochreous. Thorax pale ochreous, sprinkled with blackish scales, and with five longitudinal rather irregular black lines, with a short crest in front and another behind. Abdomen and legs pale ochreous. Forewings moderately broad, slightly dilated; pale ochreous faintly tinged with pale pinkish-brown; a slender blackish subcostal streak suffused with pinkish-brown, from base of costa to beyond middle, leaving a pale costal streak; a straight rather broader fuscous streak, mixed with blackish, from base to costa immediately before apex, strongly but irregularly margined beneath with black; from posterior half of its upper edge this sends three slender dark fuscous lines to costa, separated by whitish spaces; from $\frac{1}{3}$ and $\frac{2}{3}$ of its lower margin it sends two slender dark fuscous streaks to hindmargin; except at junction of these, it is margined beneath with an irregular, rather indistinct, silvery-white streak; the median vein and its branches marked out with strong dark fuscous lines;

from the fourth branch near its base rises an irregular black streak running a little below the main median vein, meeting its extremity on hindmargin, margined beneath by a broad silvery-white streak, interrupted where it crosses the second and third branches; the basal part of the median vein and half the fifth branch is margined beneath by a narrower silvery-white streak ending in some black scales; between the second and fourth branches are several irregular spots of black scales; a blackish line from near base to anal angle; a blackish spot almost on inner margin near base, sending a cloudy blackish streak towards hindmargin; a blackish line along posterior half of inner margin; a row of irregular blackish spots before hindmargin between the veins; cilia whitish, partially tinged with pale pinkish-brown; with a dark fuscous spot at apex, and intersected at the junction of each vein by a blackish line. Hindwings fuscous-grey, darker towards apex and hindmargin; cilia white.

This singular insect (erroneously referred by Walker to *Orambus*) is rather common near Sydney and at Campbelltown, and occurs also in the neighbourhood of Brisbane, in April, September, and December; always beaten from Casuarina, on which the larva doubtless feeds.

CRAMBUS F.

Ocelli distinct. Tongue longer than thorax. Antennæ setaceous, in ♂ generally slightly ciliated or sometimes pectinated, in ♀ simple. Labial palpi long, attenuated, compressed. Maxillary palpi triangular, incumbent. Forewings oblong, acute; hindwings with basal pecten, not reaching beyond anal angle of forewings.

The species of this cosmopolitan grass-feeding genus are tolerably numerous in Australia; those here described, all that I have yet seen, may be thus tabulated:

- A. Apex of forewings strongly produced 1. *micellus*.
- B. " " not strongly produced
 - a. Forewings with two discal longitudinal silvery-white streaks.
 - I. Upper streak starting from middle of wing 5. *aurantiacus*.

- II. Upper streak starting from very near base.
1. Lower streak quite straight 6. *trivittatus*.
 2. " " deflected upwards at apical extremity 7. *bivittellus*.
- b. With one discal longitudinal silvery-white streak.
- I. Streak simple.
 1. With a broad silvery-white streak along inner margin ... 2. *consimellus*.
 2. Without inner-marginal streak.
 - * Discal streak produced through cilia 4. *torrentellus*.
 - ** " ending on hindmargin 3. *lativittalis*.
 - II. Furcate.
 1. Streak shortly bifurcate, not reaching beyond $\frac{1}{2}$ 9. *hoplitellus*.
 2. " 3 or 4 branched, nearly reaching hindmargin ... 12. *relatalis*.
- c. With many irregular broad silvery-white markings 8. *plumiferellus*.
- d. With more or less distinct white streaks on all the veins.
- I. Subcostal streak starting from $\frac{1}{2}$ 13. *opulentellus*.
 - II. " " almost from base.
 1. Head white, with an ochreous stripe on crown, hindwings whitish-grey 15. *enneagrammos*.
 2. Head pale ochreous; hindwings white 14. *invalidellus*.
- e. With an indistinct whitish streak or none.
- I. Head white 10. *cuneiferellus*.
 - II. " ochreous-grey 11. *dimidiellus*.

Cr. milvellus n. sp.

5 $\frac{1}{2}$ ". Head white, with a broad ochreous-brown longitudinal stripe on crown. Labial palpi twice as long as head, dark fuscous, beneath white at base; maxillary palpi whitish above. Antennæ whitish. Thorax fuscous, indistinctly whitish in front and on lateral margins. Abdomen greyish-fuscous, anal-tuft greyish-ochreous. Legs whitish-ochreous-grey. Forewings short, triangularly dilated, apex strongly produced, hindmargin obliquely concave below apex, rounded beneath; rather dark fuscous, especially towards apex; a rather broad white streak, very irregularly waved on margins, proceeding from base to middle of

disc, there deflexed upwards and running to costa just beyond $\frac{1}{2}$; a white streak, internally very irregularly margined, from $\frac{1}{2}$ of fold to apex of wing, confluent above middle with a white band along hindmargin; inner margin almost entirely suffused with white, and between first and second white streaks ground-colour mixed with white scales; a rather indistinct, outwardly curved, wavy blue-whitish subterminal line, bordered with ground-colour where it cuts the white subapical band; hindmarginal line strong, black, marked on lower half with about five black spots; cilia white, with fuscous-grey parting-line, towards anal angle almost entirely grey-fuscous. Hindwings rather pale fuscous-grey; cilia hardly paler.

1♂, near Sydney, in March; very distinct from all known species.

Cr. concinnellus, *Wkr. Cat.* 165.

8"—9". Head white, labial palpi twice as long as head, white, on sides fuscous. Antennæ whitish. Thorax white, lateral margins dark fuscous. Abdomen whitish. Legs ochreous-whitish internally, greyish-fuscous externally, tarsi with whitish rings at apex of joints. Forewings elongate, slightly dilated; apex produced, acute, appearing from the cilia slightly falcate, hindmargin beneath apical indentation hardly oblique, rounded beneath; dark fuscous or blackish, blackest along costa; a straight broad silvery-white streak from base to apex, upper margin of basal half almost touching costa, apical half gradually more attenuated; a rather narrower silvery-white streak along inner margin from base to anal angle; a slender bluish-white subterminal line, cutting the longitudinal streaks, proceeding from beyond $\frac{1}{2}$ of costa obliquely outwards, sharply angulated on first streak, thence tolerably parallel to hind margin, angulated again on second streak, ending before anal angle; on costa before subterminal line are two more oblique slender white streaks, and between it and apex another less distinct, not oblique; behind subterminal line the space between the two longitudinal streaks is cinereous-grey, sprinkled with white scales, and cut by three longitudinal black lines; the disc immediately before subterminal line is also more or less sprinkled with cinereous-grey

and whitish scales; hindmarginal line blackish: cilia pale grey, whitish at extremities of longitudinal streaks, and with a small whitish spot about middle, and a grey fuscous indistinct parting line; above apex and below anal angle fuscous. Hindwings whitish, subtransparent, suffused with pale fuscous grey at apex and on upper margin; cilia white.

Belongs to the section of which the European *pascuellus* L. is typical, but differs from all other species by the broad silvery-white inner-marginal streak. Occurs near Sydney, also about Brisbane and Rockhampton. It would appear to have an extraordinary range for an insect of this class, being stated by Walker to occur also in Ceylon and South Africa.

Cr lativittalis, Wkr. Cat. 171; *halterellus* Z. Cr. 33.

11"—14". Head ochreous-brown, with a very slender (sometimes obsolete) short white line above each eye. Labial palpi short, hardly longer than head, ochreous-brown or dark brown, whitish beneath; maxillary palpi ochreous-brown. Antennæ dark fuscous. Thorax ochreous-brown or dark brown, anterior margin narrowly and a lateral marginal stripe silvery white. Abdomen whitish, slightly tinged with ochreous. Anterior and middle legs dark fuscous, posterior legs whitish. Forewings moderately broad, dilated, hindmargin nearly straight, lightly rounded beneath; varying from brownish-ochreous to deep brown; a narrow silvery-white costal streak from base to a little before apex, posteriorly slightly dilated; a very broad straight silvery-white, strongly black-margined central streak from base to hindmargin, its upper apical angle produced upwards into a tooth along hindmargin to apex, the lower part of its hindmarginal edge also black-margined: cilia ochreous-brown, darker greyish-fuscous at anal angle, with indistinct darker parting-line. Hindwings pale greyish-fuscous, whitish towards base, in ♂ with a slender pencil of brown hairs in a depression at base; cilia whitish, tinged towards base with ochreous-grey.

Easily known by the up-turned apex of the single median streak, and remarkably short palpi. A common species, occurring round Sydney, and up to the summits of the Blue Mountains; also at Melbourne and King George's Sound; from October to March. Walker's name has one year's priority.

Cr. torrentellus n. sp.

15"—15½". Head ochreous, with a small whitish spot on crown, and a pale line above each eye; collar whitish. Labial palpi more than twice as long as head, ochreous, at apex fuscous, beneath white towards base; maxillary palpi ochreous. Antennae fuscous, basal joint ochreous. Thorax ochreous-brown, with a broad silvery-white stripe on each shoulder. Abdomen pale ochreous. Anterior and middle legs fuscous, posterior legs ochreous. Forewings elongate, moderately broad, hardly dilated, hindmargin very oblique, rounded; very pale ochreous, towards apex and at base suffused with brownish-ochreous, and very slightly on disc; a very narrow silvery-white costal streak from middle of costa to apex, sometimes produced further towards base, much attenuated at extremities; very broad straight silvery-white median streak from base to hindmargin, continued also quite through cilia, strongly but irregularly margined on both sides with blackish scales, least distinctly on disc; very broadly and strongly towards apex, especially on upper margin; sometimes the upper margin of this streak tends slightly to be produced upwards on hindmargin: cilia, except on the white streak, fuscous-grey, with a rather darker parting line. Hindwings white, in ♀ slightly suffused with greyish towards apex; cilia white.

Differs from preceding by the longer palpi, paler colour, and median streak produced through cilia, as well as the absence of any distinct apical tooth; from allied European species by its large size, and the very great breadth of the median streak. Hitherto only from neighbourhood of Duaringa, Queensland; two specimens in Sydney Museum, sent by Mr. Geo. Barnard.

Cr. aurantiacus n. sp.

10"—10½". Head bright ochreous, with a whitish line above each eye. Labial palpi twice as long as head, deep ochreous tinged with fuscous, beneath white towards base; maxillary palpi whitish above. Antennae silvery-grey, basal joint whitish. Thorax bright deep ochreous, with two parallel longitudinal silvery-white streaks on back. Abdomen silky-white. Legs white beneath fuscous. Forewings rather short, broad, hindmargin,

tolerably straight, rounded beneath; bright orange-ochreous; a silvery-white, internally fuscous-margined, rather narrow costal streak from near base to $\frac{1}{2}$, much attenuated towards both extremities; a broad silvery-white fuscous-margined streak from middle of wing below costa, posteriorly abruptly angulated upwards and ending in apex, rather suddenly attenuated at both extremities; a broad straight silvery-white fuscous-margined streak from base through middle of wing, posteriorly attenuated, barely or not quite reaching hindmargin; a narrow silvery-white partially fuscous-margined streak along inner margin from base to anal angle; a clear dark fuscous line along inner and hind-margins: cilia silvery-white, with two sharp dark fuscous parting lines. Hindwings pale fuscous, more whitish towards base; cilia pure white.

Differs markedly from the two succeeding species by the basally abbreviated upper streak, shorter wings, &c. Several specimens near Newcastle in January.

Cr. trivittatus Z. *Cr.* 34; *vivittellus* Wkr. *Cat.* 171 (*nec* Don.)

11"—15 $\frac{1}{2}$ ". Head ochreous, with a clear white line above each eye, and sometimes whitish behind. Labial palpi two and a half times as long as head, ochreous-brown or dark brown, beneath clear white; maxillary palpi whitish above. Antennæ dark fuscous. Thorax ochreous, darkest on shoulders, with two broad silvery-white longitudinal stripes on back. Abdomen pale greyish-ochreous, basal segment silvery-white. Anterior legs greyish-fuscous, middle and posterior legs whitish. Forewings rather broad, hind margin very slightly sub-concave beneath apex, almost straight; light brownish-ochreous, generally paler towards inner margin; extreme costal edge white from a little before middle to a little before apex; a silvery-white blackish-margined streak starting from very near base immediately below costa, at first narrow and parallel to costa, before one-third deflected from costa and continuing parallel to median streak, becoming much broader, its extremity abruptly deflected upwards shortly before hind margin, becoming attenuated, and ending in apex; a nearly straight broad silvery-white blackish-margined median streak from base to hind margin, somewhat attenuated towards its ex-

tremity; a silvery-white streak along inner margin from base to anal angle, internally rather indistinct, externally margined by a greyish-fusca streak along inner margin; hind-marginal line dark fuscous: cilia silvery-white, fuscous at tips, and with a broad cloudy dark fuscous parting-line. Hindwings greyish fuscous, in ♀ more whitish, hind-marginal line fuscous; cilia in ♂ greyish or whitish, with darker grey parting line, in ♀ white.

Differs from *aurantiacus* by the upper discal streak nearly reaching base, from *bivittellus* by the straight extremity of the lower discal streak, from both by the duller ground colour. A common and very generally distributed species, occurring from Sydney to the summits of the Blue Mountains, also about Melbourne, Adelaide, Rockhampton, and in Tasmania, in December and January.

Zeller described this as new, quoting Erichson as authority that *bivittellus* Don. is not this, but the following species; Walker, considering this to be Donovan's insect, re-named the other *recurvellus*.

Or. bivittellus, Don.; *Z. Or.* 34; *recurvellus*, *Wkr. Cat.* 171.

15". Head deep orange, posteriorly ochreous, with a silvery-white line above each eye. Labial palpi more than twice as long as head, slender, acute, exteriorly crimson-orange, towards apex fuscous, interiorly pale ochreous, beneath white at base; maxillary palpi ochreous, above deep orange. Antennæ in ♂ deeply dentate, ciliated with little tufts of hairs, dark fuscous, basal joint silvery-white. Thorax saffron-orange, with a rather broad longitudinal silvery-white stripe on each side of back. Abdomen whitish-ochreous, anal tuft darker ochreous. Anterior and middle legs dark greyish-fuscous; posterior legs whitish, tarsi suffused with greyish-fuscous. Forewings broad, dilated, hind margin nearly straight, lightly rounded beneath; deep saffron-orange, towards apex and hind margin tinged with crimson; a slender silvery-white costal streak from beyond middle to beyond three-quarters, other parts of costa slenderly dark fuscous; a silvery-white strongly black-margined longitudinal streak proceeding from costa a little above base, at first rather narrow, dilating gradually, at one-third deflected from costa and continued

parallel to median streak, becoming broadest at two-thirds, abruptly curved upwards immediately before hind margin, becoming more attenuated, and ending in apex; a straight silvery-white strongly black-margined median streak from base, its apex sharply curved upwards shortly before hind margin, and ending in a short point directed towards apex of wing, not reaching hind margin; a moderate fuscous streak along inner margin, bordered internally by a narrow silvery-white black-margined streak from base to anal angle; hind-marginal line blackish: cilia silvery-white, fuscous-grey towards tips, and entirely at anal angle. Hindwings greyish-fuscous, slightly paler towards base; cilia greyish-fuscous.

Common at King George's Sound, but apparently exclusively western. Easily known by its brilliant colouring, and the recurved extremities of *both* discal streaks.

Cr. pleniferellus Wkr. Cat. 173.

9"—11". Head white, face, a longitudinal median line, and a spot behind each eye ochreous. Labial palpi twice as long as head, ochreous mixed with fuscous, beneath white towards base; maxillary palpi ochreous, whitish above. Antennæ whitish, tinged with ochreous. Thorax ochreous, darkest anteriorly, whitish posteriorly; anterior margin and five longitudinal lines (central, sub-dorsal, and lateral) slenderly white, often indistinct. Abdomen ochreous-whitish, basal segment white. Legs white. Forewings broad, strongly dilated, hind margin slightly wavy, very slightly sub-concave beneath apex; bright ochreous, darkest towards costa; a rather narrow silvery-white sub-costal streak, very close to costa, from base to beyond middle; a broad silvery-white, very elongate-triangular, median streak from base, its apex reaching to a little beyond middle, its upper edge parallel to costa, lower edge parallel to inner margin, outer edge much more oblique than hind margin and black-margined; from middle of its lower edge proceeds a slender silvery-white tooth along fold, not reaching middle; an indistinct white streak along inner margin near base; a straight rather broad oblique silvery-white streak from three-fourths of costa to before middle of inner margin (parallel to posterior edge of median streak), generally quite

or partially interrupted below middle and on fold, posteriorly emitting two black-margined wedge-shaped teeth, one between the two interruptions and one immediately above them; an outwardly curved pale metallic-grey subterminal line a little before hind margin, starting from a white spot on costa; between subterminal line and the transverse streak is a transverse curved row of six or seven silvery-white, sub-ovate, more or less (sometimes very strongly) elongate spots, the narrow interspaces strongly lined with blackish scales; between subterminal line and hind margin, touching both, are four silvery-white spots, first sub-triangular, subapical; second quadrate, in middle; third and fourth quadrate, adjacent, above anal angle; hind-marginal line dark fuscous, with sub-triangular blackish spots on extremities of veins: cilia silvery-white, tips and a parting-line fuscous-grey. Hindwings whitish-grey, in ♀ slightly darker, hind-marginal line dark fuscous; cilia white, with a faint grey parting-line.

Common in the Sydney district, and around Melbourne, in February and March.

Cr. hoplitellus n. sp.

10"—11". Head ochreous-brown, with a whitish line over each eye. Labial palpi twice as long as head, ochreous-brown, mixed with darker-fuscous, beneath whitish. Antennæ dark fuscous, in ♂ strongly pectinated. Thorax deep ochreous-brown. Abdomen whitish, towards base tinged with greyish-fuscous. Legs dark fuscous, posterior pair more whitish above. Forewings moderately broad, hind margin very slightly sub-concave, almost straight; deep brownish-ochreous, partially suffused with darker brown; a straight narrow silvery-white sub-costal streak, proceeding from costa near base, and ending on costa again shortly before apex, enclosing a narrow fuscous costal streak; a silvery-white, strongly blackish-margined, central streak from base, gradually dilating to beyond middle, where it becomes abruptly bifurcate, both branches short, reaching to three-fourths of disc; upper branch slender, abruptly swollen towards apex beneath; lower branch short-pointed, with a tooth above; about the apex of each branch is an irregularly oval cloud of mixed black and bluish-white scales; from between these two clouds proceeds a silvery-white,

above strongly black-margined, broad streak obliquely upwards to apex, sharp-pointed above, sending from its lower edge a more or less distinct silvery-white line towards anal angle; apex of wing suffused with dark fuscous; three or four triangular black dots on hind margin towards anal angle; an indistinct line of dark fuscous scales along inner margin; cilia silvery-metallic grey, white at base towards apical half of hind margin. Hindwings whitish-grey, indistinctly darker grey-fuscous at apex and along hind margin; cilia whitish.

A very distinct species; abundant in a very restricted locality near Sydney, in March.

Cr. cuneiferellus Wkr. Cat. 175.

$7\frac{1}{2}$ "— $9\frac{1}{2}$ ". Head clear white. Labial palpi twice as long as head, white, towards apex and on sides mixed with greyish-ochreous; maxillary palpi white, beneath mixed with fuscous-grey. Antennæ whitish. Thorax white, towards sides and behind tinged with pale greyish-ochreous. Abdomen pale greyish-ochreous, towards base whitish. Legs white. Forewings short, posteriorly dilated, in ♀ more elongate, hindmargin rounded; pale greyish-ochreous, sometimes more or less sprinkled posteriorly with whitish and fuscous scales; the veins more or less perceptibly indicated by lines of fuscous scales; a snow-white median streak from base to hindmargin, often very indistinct or obsolete, especially towards base, most conspicuous at $\frac{2}{3}$; margins obscure; indications of three transverse slender (sometimes obscurely double) dark ochreous-brown lines; first very faint or absent, beyond $\frac{1}{3}$, only perceptible near inner margin, where it is angulated; second sometimes distinct, rising from middle of costa, proceeding obliquely outwards to $\frac{1}{3}$ of breadth, then sharply angulated and proceeding obliquely inwards to median streak, where it becomes obsolete, but is sometimes again sharply angulated outwards; third generally distinct, a little before hindmargin, strongly waved, outwardly curved, at $\frac{2}{3}$ of breadth from costa sending a very sharp angulation inwards; between third line and hindmargin the ground-colour is replaced by black and white scales arranged in alternate transverse lines, giving a bluish-grey appearance, the veins indicated by whitish lines;

hindmarginal line blackish, unspotted; cilia shining grey, pale towards tips, intersected by a rather broad white longitudinal mark at median streak, another less broad below it, and two others much narrower and more indistinct above it, with faint traces of a parting-line. Hindwings fuscous-grey, paler in ♀; cilia white, with a fuscous-grey parting-line near base.

Var. a. Entirely suffused with greyish-ochreous, leaving no trace of white colour either on head or forewings, or of the transverse lines on forewings; only markings the bluish-grey wedge-shaped markings on hindmargin; cilia of hindwings also suffused with greyish-ochreous.

Always distinguishable by the wedge-shaped hindmarginal markings. The *var. a* is singular in appearance, and at first sight appears distinct, but is probably only a dull-coloured spring form; two specimens (without the ordinary form) were taken by Mr. G. H. Raynor, near Parramatta, in August. The ordinary form is the commonest of the genus in New South Wales, occurring in great abundance everywhere from Sydney to the Blue Mountains, at Newcastle, and probably generally; also near Melbourne, and in the Rockhampton district, from November to April.

Cr. dimidiellus n. sp.

5½"–8". Head ochreous-grey. Labial palpi more than twice as long as head, dark fuscous sprinkled with grey, beneath white at base; maxillary palpi whitish above, dark fuscous beneath. Antennæ ochreous-grey. Thorax brownish-grey. Abdomen greyish-ochreous, anal-tuft paler. Legs greyish-white above, fuscous beneath. Forewings elongate, not much dilated, hindmargin rounded; light ochreous, tinged with grey, the lower half more or less slightly (especially posteriorly), the upper half entirely suffused with ochreous-brown or dark-brown; lower half more or less partially sprinkled with dark fuscous scales; a white median streak from base to hindmargin, broadest at ½, posteriorly attenuated or partially obsolete, above generally margined with blackish scales, especially posteriorly, where they are sometimes very numerous, and form a cloudy blackish band along the streak; generally there are faint indications of two transverse lines, which

are sometimes entirely obsolete, rarely distinct; first line very faint, double, only appearing as two ochreous-brown spots, mixed with blackish scales, on inner margin before middle, and two obliquely above them on lower margin of median streak beyond middle; second line sometimes tolerably distinct, waved, sharply angulated above median streak and sometimes also with a second indistinct angulation towards inner margin, whitish, edged internally with darker ochreous-brown; hindmarginal line dark fuscous, containing three or four distinct black dots towards middle; cilia fuscous-grey, rather metallic. Hindwings fuscous-grey; cilia whitish-grey or whitish, with a fuscous-grey parting-line near base.

Allied to *cuneiferellus*; differs by the narrower wings, smaller size, darker colouring, hindmarginal dots, &c. Also very common, round Sydney and Parramatta, and in the district of the Lower Hunter River; also received from Rockhampton; from January to March.

Cr. relatalis Wkr. Cat. 172.

12"—13½". Head pale ochreous, mixed with whitish, with a very narrow white line above each eye. Labial palpi more than twice as long as head, pale ochreous, much mixed with fuscous towards apex, beneath clear white at base; maxillary palpi white above, fuscous at base. Antennæ whitish. Thorax ochreous, posteriorly white, and with a broad quadrate ochreous-white spot behind collar. Abdomen silky-white, anal-tuft whitish-ochreous. Anterior and middle legs grey-fuscous, thinly whitish-scaled above; posterior legs whitish. Forewings elongate, moderately broad, hindmargin subconcave below apex, thence strongly rounded; greyish-ochreous or greyish-brown tinged with ochreous, especially towards base, towards inner margin rather abruptly and broadly whitish-ochreous, and sometimes also more narrowly along costa; a straight silvery-white, internally blackish-margined subcostal streak from base to costa shortly before apex, with a tendency to emit two or three faint branches towards costa posteriorly; a straight moderately broad silvery-white black-margined central streak from base, parallel to subcostal streak, beyond middle deflected downwards and continuing parallel to inner

margin, ending abruptly just before hindmargin; from the point of deflection proceeds a second branch similar and nearly parallel to the first, but more slender and sometimes in great part obsolete; from half-way between origin of this branch and base rises a third very slender branch, proceeding nearly to anal angle, but generally obsolete at extremity; the interspaces between these branches are somewhat suffused anteriorly with blackish; immediately above the point of deflection of the median streak, but not touching it, rises a moderately broad, basally attenuated, silvery-white blackish-margined streak proceeding directly towards hindmargin, but ending abruptly before reaching it; above this is sometimes also a faint whitish short linear mark; a white submarginal streak from apex to anal angle, inwardly convex, not touching hindmargin, receiving the apices of all the discal streaks, broadest above, sometimes obsolete or absent on its lower half, internally edged with fuscous shading; immediately before and parallel to this submarginal streak is sometimes a wavy pale bluish line; hindmarginal line dark fuscous, with three or four elongate black dots towards anal angle; cilia white, tips and a strong parting-line (sometimes confluent) dark metallic-grey. Hindwings whitish-grey, apex and hindmargin rather abruptly darker grey, hindmarginal line fuscous; cilia white, with a faint grey parting-line near base.

Allied to the three succeeding species, differing especially by the median streak having only two branches beneath, instead of three or four. Not very common, but very widely distributed, occurring at Sydney, and on the Clarence River; near Melbourne and Adelaide, and in Tasmania; in March.

Cr. opulentellus Z. Cr. 46.

11 $\frac{1}{2}$ "-12 $\frac{1}{2}$ ". Head greyish-ochreous, with a rather broad whitish line above each eye. Labial palpi more than twice as long as head, fuscous, beneath whitish at base; maxillary palpi whitish, towards base fuscous. Antennæ dark fuscous. Thorax ochreous, darker above, with a slender white longitudinal line on each side of back, forming two conspicuous approximated white spots behind the collar. Abdomen whitish-ochreous, more suffused with

grey towards base. Anterior legs fuscous; middle and posterior legs pale ochreous. Forewings moderately broad, hindmargin oblique, rounded, subconcave beneath apex; ochreous; a very narrow silvery-white costal streak from base to beyond middle; a broader silvery-white subcostal streak from one-third to costa immediately before apex, attenuated at extremities; a strong silvery-white central streak on sub median vein from base to hindmargin, roughly margined with blackish scales on apical half above and on basal half beneath; sending from its lower edge four very slender silvery-whitish branches to hindmargin, the lowest branch more or less blackish-margined, and the tolerably broad ochreous interspaces sometimes mixed with blackish or grey scales; an elongate-triangular silvery-white subapical spot, resting on hindmargin below apex and on posterior quarter or median streak, partially or entirely cut longitudinally by two blackish-ochreous lines; below median streak a straight silvery-white streak from near base to anal angle, and a silvery-white streak from base to inner margin at one-third; a fuscous line along inner and hind margins, hindmarginal line marked with seven or eight often obsolete blackish dots; cilia white, becoming metallic-grey at tips, and entirely about anal angle. Hindwings pale greyish-fuscous, hindmarginal line dark fuscous; cilia white.

This and the two following species are very nearly allied, and it is probable that several other closely related species remain to be found. *Opulentellus* differs from both the others by the subcostal streak not reaching nearer to base than one-third, the dark fuscous anterior legs, and general distinctness of marking. Taken commonly at Parramatta in April; Zeller's specimen was taken in Tasmania.

Cr. invalidellus n. sp.

11". Head pale ochreous, with a very slender whitish line above each eye. Labial palpi more than twice as long as head, acute, pale ochreous; beneath whitish at base; maxillary palpi ochreous. Antennæ ochreous-fuscous, in ♂ deeply dentate. Thorax ochreous. Abdomen whitish-ochreous, anal tuft whitish. Anterior legs ochreous, middle and posterior legs whitish. Forewings rather elongate, apex acute, hindmargin slightly sub-con-

cave beneath apex, rounded beneath; pale ochreous, thinly sprinkled between the veins with coarse dark fuscous scales; a straight rather broad white subcostal streak from base of costa to costa again a little before apex, shading into pale whitish-ochreous on costal margin, from two-thirds of its lower margin sending a faint whitish branch to hindmargin below apex; between the subcostal streak and median vein the ground colour is suffused with fuscous, darkest above, forming a broad streak from base to two-thirds of disc, where it becomes obsolete, appearing again as a dark fuscous spot at apex; a dark fuscous spot on upper margin of median vein at two-thirds; median vein indistinctly whitish, very obsolete towards base, sending four indistinct whitish branches to hindmargin, which are interrupted just before reaching hindmarginal streak; fourth branch very faint; beneath these are very faint indications of whitish lines on the other veins; a clear white streak along hindmargin from apex to anal angle, broadest above; hindmarginal line strong, clear, dark fuscous, towards its lower half with five black elongate spots on extremities of veins: cilia white, tips and a parting-line pale metallic-grey. Hindwings white, hindmarginal line indistinctly fuscous; cilia white.

Distinguished from *opulentellus* by the more suffused markings, and sub costal streak reaching base; from *enneagrammos* by the ochreous head and narrower forewings, from both by the white hindmarginal streak, and clear white hindwings. One ♂ in collection of Mr. Masters, from Tasmania.

Cr. enneagrammos n. sp.

9"—12". Head white, with a longitudinal ochreous stripe on crown. Labial palpi more than twice as long as head, ochreous-fuscous above, white internally and beneath; maxillary palpi white, fuscous at base. Antennæ slender, whitish above, dark fuscous beneath. Thorax brownish-ochreous, whitish on back, with a clear white double spot on collar. Abdomen ochreous-whitish. Legs ochreous-whitish. Forewings broadly dilated in ♂, narrower and more pointed in ♀, hindmargin rounded, sub-concave below apex; varying from ochreous-grey to clear

ochreous, lighter towards inner margin; extreme costal edge narrowly white; a straight, rather narrow white sub-costal streak from base to apex, sometimes emitting posteriorly two or three slender white streaks to costa, or partially confluent with the white costal line; a rather strong white, above black-margined posteriorly, central streak on sub-median vein from base to hindmargin, sending from its lower edge four rather broad parallel branches to hindmargin, separated by very narrow ochreous lines (sometimes sprinkled with blackish), lowest branch often strongly blackish-margined; an elongate-triangular white subapical spot, resting on hindmargin below apex and on posterior third of median streak, more or less distinctly cut by two rather obsolete ochreous (sometimes mixed with blackish) longitudinal lines; below median streak a white line from near base to anal angle, and a white line from base to before middle of inner margin; inner margin whitish towards base; hindmarginal line fuscous, marked with seven or eight black dots; cilia white, extreme tips and a parting line greyish-ochreous. Hindwings whitish-grey, marginal line dark fuscous; cilia white.

Differs from its allies by its broader wings, white head, and greater breadth of the white streaks on the branches of the submedian vein. Common round Sydney and Parramatta, especially in rather damp places; also near Melbourne and Mt. Macedon; in December and March.

It is possible that *O. argyroneurus* Z. (described from a single South Australian specimen) may denote a variety of this insect, as it possesses many of its characteristics; but Zeller describes the head as yellowish, the first and second branches of the median vein as not reaching hindmargin, the second and third as becoming confluent beyond the middle, and makes no mention of any white sub-apical spot. Considering the close affinity of the species of this group, it would be premature to adopt the name for this insect.

EROMENE Hb.

Ocelli distinct. Tongue moderate, spiral. Antennæ setaceous, crenulate. Labial palpi hardly as long as, or markedly shorter than thorax, straight, porrected, acuminate. Maxillary palpi

shortly triangular. Forewings subtriangular, in ♂ with a transparent spot at base of median cell, hindmargin with black spots united by metallic-gold; hindwings with basal pecten.

Of the four species hereafter described, the first two hardly fall well into the genus, owing to their longer palpi, yet they possess the general characters; the others agree with *Eromene* in all respects. They may be tabulated thus:—

- | | |
|---|-----------------------------|
| A.—Forewings with broad silvery-white markings... | 2. <i>bifracetella</i> . |
| B.— " without distinct silvery-white markings | |
| 1.—Forewings with a central oblique fascia. | 1. <i>longipalpella</i> . |
| 2.— " with two slender transverse lines. | |
| a.—Labial palpi hardly longer than head ... | 3. <i>praematurarella</i> . |
| b.— " " nearly twice as long as head ... | 4. <i>dilatella</i> . |

Er. longipalpella n. sp.

10"—11". Head whitish. Labial palpi twice as long as head, whitish, mixed with dark fuscous scales, dark fuscous on sides; maxillary palpi white. Antennæ whitish-ochreous. Thorax and abdomen ochreous. Legs ochreous-grey, tarsi with ochreous-white rings at apex of joints. Forewings elongate, rather dilated, costa straight, hindmargin subdentate, slightly rounded; ochreous, suffused with white, especially on disc, which is almost entirely white and rather thickly irregularly sprinkled with fine black scales, especially towards posterior part of disc, sometimes coalescing in parts to form irregular blackish spots; towards base the white colour forms a distinct median streak from base, which shortly becomes dilated and suffused into the ground colour; a transverse central fascia of the ochreous ground colour, sprinkled with whitish and blackish scales, gently angulated above and below middle, bisected throughout by a violet-silvery metallic line, indistinct on margins; at two-thirds of disc, nearest to costa, is a crescentic violet-silvery metallic mark, strongly margined with black internally and less strongly externally; behind this are four irregular elongate spots of black scales; a silvery-metallic outwardly-curved subterminal line, indistinctly margined internally with blackish; costa before apex blackish; a small white spot on hindmargin in middle, a faint one below apex, and a clear double one above anal angle; hindmargin with seven black

spots on extremities of veins, lower ones largest and sharpest: cilia silvery-metallic-grey, with a whitish line at base and in middle, and intersected by slender white marks at the veins. Hindwings pale fuscous-grey; cilia white, with a fuscous-grey parting line near base.

Near Melbourne; not scarce.

Ex bifractella Wkr. Cat. 174 (*Oreambus*).

8"—9 $\frac{1}{2}$ ". Head ochreous-brown. Labial palpi long, ochreous-brown or dark brown, brassy-metallic on sides. Antennae in ♂ stout, subdentate, above white with dark fuscous rings, beneath dark fuscous; in ♀ slender, white with dark fuscous rings. Thorax ochreous-brown, at base silvery-ochreous-grey. Abdomen pale greyish-ochreous, somewhat silvery at base. Legs pale greyish-ochreous, anterior pair and posterior tarsi partially suffused with greyish-fuscous. Forewings subtriangular, rather broad, dilated; deep clear ochreous, darkest along costa; a silvery-white black-margined costal streak from base, at first very narrow, much broader posteriorly, deflected from costa about middle, and ending at three-fifths a little below costa; a broad straight silvery-white black-margined streak from base to three-fifths of disc, its apex abruptly blunt-pointed, perpendicularly beneath apex of costal streak; an indistinct silvery-white partially black-margined streak of variable width along inner margin from base, its apex in a straight line with those of costal and median streaks: a subtriangular silvery-white black-margined subcostal spot between costal streak and hind-margin, its base obliquely concave, with the upper angle sometimes reaching costa, its apex almost reaching the subterminal line; an oblong silvery-white black-margined streak between apex of median streak and hind margin, reaching hind margin, bisected longitudinally by a blackish line, and interrupted by the sub-terminal line; the space between this streak and anal angle is whitish-ochreous or whitish (in ♀ silvery-white), irrorated with blackish scales; the space between it and subcostal spot is whitish-ochreous, irrorated with blackish scales and bisected longitudinally by a blackish line; a sinuate bluish-silvery metallic line proceeding from inner margin

immediately beyond the streak from base perpendicularly upwards to disc, suddenly bent round apex of median streak, and continued between median and costal streaks to base; a sinuate (sometimes broken) transverse bluish-silvery metallic mark on disc between the bend of this line and the subcostal spot; a bluish-silvery metallic subterminal line proceeding from a small whitish spot on costa at two-thirds very obliquely outwards, curving round a little below apex, and continued very near hind-margin to anal angle; a small white apical spot; three deep black dots on hind margin, on the junction of the white streak from disc: cilia silvery-grey, metallic, white at base towards apical half, often with a basal row of silvery-grey metallic spots. Hindwings pale grey; cilia in ♂ whitish-grey, with darker parting shade, in ♀ clear white.

Not very common; occurs round Parramatta, near Duaringa, and in South Australia, in February and March. This species might, perhaps, be better placed in *Crambus*.

Er. praematurella n. sp.

4½"—5". Head ochreous-brown. Labial palpi hardly longer than head, dark fuscous, with a conspicuous oval yellow spot on side towards base. Antennæ ochreous. Thorax ochreous-brown. Abdomen pale ochreous-brown. Legs whitish-ochreous. Forewings short, strongly dilated, hindmargin oblique, slightly retuse below apex; in ♂ yellow-ochreous, almost entirely suffused with white except along costa, partially on disc and beneath apex; in ♀ ochreous-brown, darkest towards apex, densely irrorated along inner margin and on posterior part of disc with whitish and black scales; two transverse slender lines; first blackish, from $\frac{1}{3}$ of costa to $\frac{1}{3}$ of inner margin, acutely angulated outwards above middle; second whitish, margined on each side with blackish, proceeding from $\frac{1}{3}$ of costa at first very obliquely outwards, curved round very strongly above middle, and continued nearly parallel to hindmargin to anal angle; between second line and apex is a short white outwardly oblique streak from costa; on lower $\frac{1}{3}$ of hindmargin a row of about eight quadrate black spots, almost touching each other, largest towards anal angle;

cilia white, with a deep metallic blackish-grey line almost along base, and cut by three very broad metallic violet-grey bands, one immediately subapical, one just above and one just below middle. Hindwings in ♂ whitish, in ♀ dark fuscous-grey; cilia white, with fuscous-grey parting-line near base.

Two specimens (♂, ♀) near Sydney, in December.

Er. dilatella n. sp.

6"—7". Head dark ochreous-fuscous mixed with whitish. Labial palpi nearly twice as long as head, long-haired beneath, blackish-fuscous, with a suffused oval deep yellow spot on side towards base. Antennæ slender, dark fuscous. Thorax blackish-fuscous, densely irrorated with whitish. Abdomen blackish-fuscous, posterior margins of segments and anal-tuft clear white. Anterior and middle legs ochreous-fuscous, posterior legs ochreous-whitish. Forewings short, broad, subtriangular, very strongly dilated posteriorly, hindmargin oblique, tolerably straight; blackish-fuscous, very densely irrorated with white scales, towards inner margin often coalescing in ♂ into irregular white patches; first line slender, sometimes partially double, irregular, blackish, suffusedly bordered with whitish, from two-fifths of costa to two-fifths of inner margin, angulated outwards below costa; second line slender, blackish, partially double, rising from a white spot on costa at three-fourths, proceeding very obliquely outwards, strongly curved round close to hind margin, and continued very near and parallel to hind margin to anal angle; a short rather oblique white streak from costa before apex; on lower two-thirds of hind margin a row of 8 quadrato elongate marks; cilia white, with a broad bright golden-metallic line along base, and a broad dark metallic grey line along tips. Hind wings in ♂ whitish, with irregular indistinct grey-fuscous shades along hind margin, in ♀ blackish-grey; cilia white, tips and a parting-line near base strongly dark-grey.

Very closely allied to *praematurella*, differing principally by the larger size, longer palpi, and the ochreous-yellow marks between the hind marginal spots. Near Parramatta, locally common, in September.

PHYCIDÆ.

NEPHOPTERYX Z.

Antennæ filiform, in ♂ sinuate above basal joint, with a tuft of scales in the sinuation. Labial palpi compressed, ascending or porrected; terminal joint moderately long. Maxillary palpi short, filiform, appressed, alike in both sexes. Forewings long and rather narrow, costa slightly curved; hindwings moderately broad, slightly indented. Forewings with 11 veins; 4 and 5 separate. Hindwings with 8 veins; 2 rising close before posterior angle of cell; 3, 4, 5 on a stalk from posterior angle of cell.

A rather large genus, of almost universal distribution.

- | | | | | | |
|----|-------------------|----|-----|----|---------------------------|
| A. | Hind wings yellow | .. | .. | .. | 2. <i>opimella</i> . |
| B. | „ whitish-grey | .. | ... | .. | 1. <i>stenopterella</i> . |

Neph. stenopterella, n. sp.

7½"—8½". Head, palpi, and thorax blackish, very minutely and densely irrorated with whitish; labial palpi straight, porrected, in ♂ rather longer than head, in ♀ nearly twice as long as head. Antennæ fuscous, in ♂ very finely ciliated, with a large elongate tuft of black scales in sinuation. Abdomen grey, segmental margins and anal tuft whitish-ochreous, second and third segments from base entirely bright ochreous. Legs blackish, very densely irrorated with whitish, tarsi with slender whitish rings at apex of joints, posterior tibiae with a slender oblique black band towards apex. Forewings elongate, very narrow, hardly dilated, costa hardly arched, hindmargin very oblique, rounded; blackish, very densely strewn with whitish scales, so as sometimes almost to conceal the ground colour, more blackish in ♀; first line rather indistinct, double, black, both sections very slender, very irregularly waved, emitting several acute teeth posteriorly; on inner margin, at junction of first line, is a short transverse ochreous-reddish spot, strongly margined internally with black; about middle of inner margin is a second less distinct reddish spot, united to a double black discal spot beyond middle by an oblique slender blackish cloud; second line blackish, double, very oblique, from a little before apex to a little before anal angle, shortly but acutely angulated inwards above middle, and again before inner

margin : cilia dark grey, with many bluish-whitish points. Hindwings sub-hyaline, whitish-grey, narrowly darker at apex, and very narrowly along hindmargin : cilia whitish-grey, with dark grey parting-line near base.

Tolerably common near Sydney, at Bowenfels, and Newcastle, from October to January ; comes freely to light.

Neph. opimella, n. sp.

8". Head, palpi, and thorax blackish-fuscons, finely and thinly irrorated with whitish ; palpi obliquely ascending, reaching considerably above head. Antennæ dark fuscons, in ♂ very finely and shortly ciliated, with an angular tuft of black scales in sinuation. Abdomen dark fuscons, with clear ochreous-yellow rings on segmental margins. Legs blackish, irrorated with whitish, tarsi with very slender whitish rings at apex of joints, posterior legs ochreous-whitish above. Forewings rather short, dilated, costa slightly arched, hindmargin somewhat oblique, rounded ; blackish, densely strewn with whitish scales, the absence of which produces clear black markings ; first line indistinct, double, slender, oblique, at one-third of wing, bordered posteriorly by a broad oblique transverse band, clearly defined towards base, posteriorly more suffused ; second line stronger, "distinct, double, from a little before apex to a little before anal angle, shortly angulated outwards below costa, and again inwards above inner margin, between the two angulations convex posteriorly ; half way between first and second lines an oval black dot above middle of disc : cilia blackish-grey, extreme tips and a slender parting-line bluish-white. Hindwings deep yellow, costa and hindmargin rather broadly bordered with smoky-fuscons, towards anal angle becoming suffused into ground colour ; cilia smoky-grey, with a blackish parting-line near base.

Several specimens near Parramatta, from June to August.

PEMPELIA Hb.

Antennæ filiform, in ♂ sinuate above basal joint, with a tuft of scales in the sinuation. Forehead with a cone of scales. Labial palpi ascending or recurved, second joint rather long, terminal joint very short. Maxillary palpi of ♂ ending in a long

tuft, concealed between labial palpi, of ♀ short, filiform. Forewings moderately long, posteriorly dilated; hind wings moderately broad, slightly indented below apex. Forewings with 11 veins; 4 and 5 separate. Hindwings with 7 or 8 veins; 2 close before posterior angle of cell; 3, 4, or 3, 4, 5, on a stalk.

Also a considerable genus, occurring throughout the world. Besides the two species described, there are certainly several others; but as all are very similar dull-coloured insects, and variable withal, I forbear describing the rest at present.

A. Forewings with a broad oblique blackish apical

streak 1. *strigiferella*.

B — without apical streak 2. *rufitinctella*.

Pemp. strigiferella n. sp.

10"-12." Head greyish-ochreous, with a few whitish and black scales. Labial palpi obliquely ascending, reaching somewhat above head, greyish-ochreous, mixed with blackish at apex. Antennæ greyish-ochreous, in ♂ thickened, dentate, minutely ciliated, with a large triangular tuft of black scales in sinuation. Thorax greyish-ochreous, with two or three black scales. Abdomen whitish-ochreous, sometimes infuscated, anal tuft of ♂ ochreous, ovipositor of ♀ rather long. Legs greyish-ochreous. Forewings elongate, strongly dilated, hind margin moderately oblique, rounded; greyish-ochreous, generally faintly irregularly streaked with whitish below costa, often somewhat suffused with greyish fuscous, and thinly sprinkled with blackish scales, especially between veins; indications of commencement of a grey-fuscous double very oblique first line on costa at one-third; a little above inner margin at one-third an oblong-elongate short black mark, sometimes very conspicuous; beyond this, above middle of inner margin, a small dark fuscous cloud, sometimes obsolete, often confluent with a cloudy dark fuscous streak along posterior part of inner margin; a double black spot before two-thirds of disc above middle; second line indistinct, double, grey-fuscous, angulated inwards a little below costa, and again very faintly above inner margin; a conspicuous broad blackish oblique apical streak, reaching from apex nearly to discal spot; a hind-marginal row of black dots; cilia whitish-ochreous-grey, with

two grey parting-lines. Hind wings whitish-fuscaous-grey, towards apex and hindmargin suffused with darker fuscous; cilia ochreous-grey-whitish, with dark-grey parting-line near base.

Common on dry grassy banks, and at light; round Sydney and Newcastle in January.

Pemp. rufitinctella n. sp.

13" Head brownish-ochreous. Labial palpi oblique, somewhat ascending, not reaching above head, ochreous-whitish mixed with dark fuscous. Antennæ ochreous-fuscous, in ♀ simple, in ♂ — (?). Thorax brownish-ochreous. Abdomen brownish-ochreous above, paler on sides and posteriorly, slightly mixed with fuscous-grey; ovipositor of ♀ short, retracted. Fore wings elongate, rather broad, dilated, hind margin moderately oblique, rounded; dark greyish-ochreous, suffused on disc and at apex with brownish-ochreous, sprinkled with blackish and dark carmine scales; first line only indicated by a few blackish scales beneath costa, very obliquely arranged; a short longitudinal blackish streak a little above inner margin at one-third, beyond which there is a faint cloudy fuscous streak along or near inner margin to anal angle; a double black spot on disc a little before two-thirds above middle; second line very indistinct, fuscous, double, on costa surrounded by a small blackish cloud, angulated inwards a little below costa; a hind-marginal row of transversely elongate black dots; cilia ochreous-whitish, towards tips pale dull carmine, with two or three slender dark-grey parting-lines, and irregular rows of ochreous-whitish points. Hind wings fuscous-whitish, slightly suffused with darker towards apex; hind-marginal line clear, sharp, dark fuscous; cilia whitish, with a dark grey parting-line near base.

Easily distinguished from *strigiferella* by its larger size, more rufous tint, and absence of apical streak. 2 ♀s at light near Parramatta in March.

ETIELLA Z.

Antennæ filiform, in ♂ sinuate above basal joint, with a tuft of scales in the sinuation. Labial palpi very long, as long as

thorax, horizontally porrected; second joint dilated above with compressed scales, broadest before middle; terminal joint very long, slender, filiform. Maxillary palpi of ♂ ending in a long tuft, concealed between labial palpi; of ♀ short, filiform. Fore wings almost parallel-sided, costa straight, curved just before apex, hind margin moderately oblique; hind wings moderately broad, indented before apex. Fore wings with 11 veins; 4 and 5 separate. Hind wings with 8 veins; 2 rising before posterior angle of cell; 3 and 4 unstalked from posterior angle of cell.

Besides the three Australian species here described, only one other species of this genus is known; which, however, possesses a wide range, extending over great part of Europe and America. All the species have a considerable general resemblance.

- A.—Costal edge wholly white 1. *sincerella*.
- B.— „ „ above white streak fuscous
 - a.—Fore wings dark slate-grey; metallic
 - border of first line continuous 2. *Behrii*.
 - b.— „ pale greyish ochreous-brown;
 - border forming three separate circular spots 3. *chrysoporella*.

Et. sincerella n. sp.

14" Head yellow-ochreous, forehead brassy-metallic. Labial palpi more than twice as long as head, brassy-ochreous, mixed on sides and at apex with dark fuscous scales; tuft of maxillary palpi of ♂ nearly as long as second joint of labial palpi, yellowish-ochreous. Antennæ of ♂ thickened, minutely ciliated, brownish-ochreous, above barred with white, with a large tuft of hair-scales, blackish above, whitish towards base, in situation. Thorax white, becoming ochreous-grey on sides and in front. Abdomen silvery-white, posterior margin of segments whitish-ochreous. Legs silvery white, tarsi infuscated beneath. Fore wings elongate, tolerably broad, slightly dilated, hind margin oblique, slightly rounded; pale greyish-ochreous, becoming darker clearer ochreous towards costal streak, thinly sprinkled on veins with greyish-fuscous; a tolerably broad pure white costal streak from base to apex, margined at base and apex beneath by short dark fuscous cloudy streaks; an indistinct cloudy greyish-

fuscous streak along inner margin from near base to anal angle ; very faint indications of a transverse oblique yellowish band before one-third, margined internally with a few silvery-metallic scales ; hind-marginal line cloudy dark fuscous ; cilia white, with two cloudy fuscous grey parting-lines. Hind wings whitish, towards apex and on hind margin narrowly suffused with fuscous-grey ; hind-marginal line dark fuscous ; cilia white, with an indistinct grey parting-line near base.

A distinct and conspicuous insect, larger and broader-winged than its congeners, easily known by the wholly white costa and obsolete fascia. One ♂, taken by Mr. Burkitt at light at Gladesville, Sydney, in September.

Et. Behrii Z. Is. 1848, 883.

8"—10". Head in ♂ bright ochreous-orange, face brassy-metallic ; in ♀ shining dark ochreous-grey. Labial palpi much more than twice as long as head, dark brassy-fuscous ; maxillary palpi in ♂ long, bright ochreous-orange ; in ♀ very short, fuscous. Antennæ dark fuscous with ochreous-whitish rings, in ♂ thickened, with a large tuft of black scales and white silky hairs in sinuation. Thorax dark ochreous-grey, in ♂ with a bright orange suffused spot on anterior margin. Abdomen whitish-ochreous, base of segments dark-grey. Legs ochreous above, dark-fuscous beneath. Fore wings elongate, narrow, slightly dilated, costa nearly straight, hind margin oblique, slightly rounded ; dark slaty-grey, densely irrorated with whitish, and sometimes in ♂ with scattered carmine scales ; a straight moderately broad clear white costal streak from base to a little before apex, enclosing a very narrow strip of ground colour along costal edge, and margined beneath by a moderately broad ferruginous streak running from base to apex of wing and changing to black towards base and apex ; a transverse very oblique ferruginous band from one-fourth of costal streak to one-third of inner margin, internally edged by a pale golden metallic line of raised scales, and within that by a broader blackish line ; an indistinct small blackish spot on lower margin of subcostal streak before two-thirds ; a hind-marginal row of rather

irregular blackish spots, often indistinct; cilia grey-whitish, with three distinct darker-grey parting-lines. Hind wings in ♂ pale fuscous-grey, in ♀ rather darker, apex dark fuscous-grey; hind-marginal line suffused with dark fuscous; cilia whitish, with dark-grey parting-line near base.

Very closely allied to the European *sinckenella* Tr., from which it differs by the narrower wings, costal white streak not reaching apex, and rust-coloured, not yellow, transverse band; from *chrysoporella* by the rather smaller size, slaty-grey ground colour, and unbroken transverse golden-metallic line. Very common and generally distributed, occurring from Sydney to the summits of the Blue Mountains, round Newcastle, at Melbourne and Adelaide, from September to January.

Et. chrysoporella n. sp.

10"—10½". Head in ♂ bright yellow-ochreous, with a whitish spot above the eyes. Labial palpi nearly thrice as long as head, dark brassy-fuscous; maxillary palpi — (?). Antennæ fuscous with whitish rings, beneath whitish, in ♂ with a large tuft of white silky hairs, clothed on one side with fuscous scales, in sinuation. Thorax brownish-ochreous, in front blackish, with a clear ochreous-yellow spot on anterior margin. Abdomen whitish-ochreous, base of segments suffused with grey-fuscous. Legs ochreous-whitish above, dark fuscous beneath. Forewings elongate, very narrow, scarcely dilated, costa straight until just before apex, hindmargin oblique, slightly rounded; pale greyish-ochreous-brown, irrorated with dark fuscous scales; a straight white costal streak, starting from a small tuft of ochreous-brown hairs almost at base, to costa a little before apex, enclosing a very narrow dark fuscous streak on costal edge, and margined beneath by a line of dark fuscous scales, becoming a wedge-shaped mark at apex, and beneath this again by a pale ochreous-yellow streak from near base quite to apex; a rather curved oblique transverse pale ochreous-yellow band from one-fourth of costal streak to one-third of inner margin, margined internally by three separate circular raised golden-metallic spots, before each of which is a blackish spot; an irregular suffused white spot towards inner margin be-

fore transverse band; a pale ochreous-yellow streak along fold from transverse band to anal angle, shortly dilated above beyond middle, beneath anteriorly margined with a silvery-white streak; branches of submedian vein posteriorly defined with dark fuscous, separated by indistinct whitish streaks; hindmarginal line dark fuscous; cilia grey-whitish, with three irregular darker parting-lines. Hindwings whitish-grey, hindmarginal line dark fuscous; cilia whitish, with dark grey parting-line near base.

Very similar to *Behrii*, distinguished by the more ochreous ground colour, the golden-metallic edging of transverse band forming three separate spots, and the ochreous-yellow and whitish streaks towards inner margin. Several ♂s from Melbourne and Adelaide.

EUCARPHIA Hb.

Antennæ filiform, simple, in ♂ somewhat pubescent. Labial palpi rather or very long, compressed, porrected, terminal joint broad, not pointed. Maxillary palpi minute or absent. Ocelli distinct. Fore wings more or less dilated, elongate; hind wings broad, somewhat indented below apex. Fore wings with 11 veins; 4 and 5 separate. Hind wings with 8 veins; 2 rising before posterior angle of cell, 3 and 4 stalked.

A rather small genus, hitherto only recorded from Europe and S. Asia.

Euc. vulgatella n. sp.

9½"—11½". Head pale greyish-ochreous, mixed with whitish. Palpi twice as long as head, pale greyish-ochreous, densely irrorated with dark-fuscous on sides and at apex. Antennæ pale greyish-ochreous, in ♂ thickened. Thorax and abdomen pale greyish-ochreous, anal tuft of ♂ pale ochreous, ovipositor of ♀ rather long, conical, bristly. Legs pale ochreous, tarsi of anterior and middle legs slightly infuscated. Fore wings elongate, narrow, costa nearly straight, hind margin oblique, slightly rounded; whitish-ochreous or pale greyish-ochreous, sometimes suffused with pale brownish-ochreous, entirely more or less densely irrorated with blackish, especially on veins, and broadly dusted with whitish along costa; a faint tendency to show a darker subcostal streak, only appearing distinctly as a short

blackish very oblique streak from apex ; at one-third a black dot above middle, and a second, much smaller and often obsolete, almost perpendicularly beneath it or slightly nearer base, on fold ; immediately before two-thirds a third larger sub-elongate black dot in middle of disc ; an indistinct, often obsolete, transverse row of five or six black dots from extremity of apical streak to anal angle ; a row of large irregular (often indistinct) black dots on hind-margin ; cilia grey, with whitish points, a whitish basal line and two dark-grey parting-lines. Hind wings pale grey, hind marginal line dark-grey ; cilia pale-grey or whitish, with dark-grey parting-line near base.

Rather variable in intensity of colouring. Very common, from Sydney to Bowenfels, and at Melbourne ; from September to January, in dry grassy places.

Euc. ensiferella, n. sp.

12". Head brownish-ochreous, face dark fuscous. Palpi twice as long as head, densely scaled, externally dark-fuscous, internally ochreous-whitish. Antennæ fuscous. Thorax ochreous, on shoulders brownish. Abdomen greyish-ochreous. Legs dark-fuscous. Fore wings elongate, narrow, costa nearly straight, lightly arched before apex, hind margin oblique, hardly rounded ; light pinkish brown-ochreous ; a rather broad ochreous-white costal streak from base to a little before apex, remainder of costa blackish, the blackish scales also extending basally half-way along both margins of costal streak ; a straight slender ochreous-white median streak from base to hind margin a little below apex, near base confluent with costal streak, beneath margined with blackish scales, much most strongly between middle and two-thirds ; between costal and median streaks an indistinct blackish transverse mark at two-thirds, and behind it a longitudinal streak of blackish scales, ending in a cloudy spot just below apex ; three branches of median vein faintly, and sub-dorsal vein more strongly defined with blackish scales ; a cloudy hind-marginal blackish line ; cilia grey, mixed with blackish-fuscous. Hind wings dark fuscous-grey, darker towards hind margin ; cilia grey mixed with fuscous, with a paler basal line.

Conspicuously different from *vulgatella* by the two longitudinal ochreous-white streaks, and absence of discal dots. 1 ♂ from Melbourne.

LASIOCERA n. g.

Forehead with a short hardly projecting cone of scales. Ocelli present. Tongue short, scaled at base. Antennæ simple, in ♂ thickened, densely clothed on basal half with thick scales. Labial palpi moderate, obliquely ascending, terminal joint short. Maxillary palpi short, filiform. Forewings rather short, dilated; hindwings moderate, slightly indented beneath apex. Legs rather short. Abdomen stout.

Characterised by the peculiar thickly-scaled antennæ of ♂. I have not yet been able to examine the venation.

Las. canilinea n. sp.

7"—8". Head, palpi, and thorax black; labial palpi white beneath towards base. Antennæ in ♂ black on basal half and at apex, whitish between, in ♀ entirely blackish. Abdomen black, with ochreous-yellow rings on posterior margin of segments; anal tuft ochreous-yellow. Legs blackish, tarsi with slender whitish rings at apex of joints, posterior tibiae ochreous-whitish except at apex. Forewings short, moderately broad, dilated, hindmargin somewhat oblique, slightly rounded; blackish, very thinly sprinkled with whitish on disc; first line white, nearly straight, oblique, at about one-third; second line white, from a small triangular white spot on costa at three-quarters to a little before anal angle, middle third broadly curved or obtusely angulated outwards; cilia blackish. Hindwings bright deep yellow, hindmargin broadly and costa narrowly blackish-fuscon; cilia smoky-blackish, with indistinct darker black parting-line near base.

This species has considerable superficial resemblance to *Nephopteryx opimella*; apart from the structural distinctions, it may be generally known by its clear blackish colour, and rather sharp white lines. Several specimens from Goulburn and Parramatta.

CEROPREPES Z.

Forehead obtuse. Ocelli present. Antennæ setaceous, in ♂ with a small tubercle above basal joint, strongly pectinated on

one side, apex simple. Maxillary palpi short, filiform. Labial palpi moderate, ascending, cylindrical. Tongue long, scaled at base. Forewings dilated; hindwings moderately broad.

Only one other species of this genus is known, from India; it does not closely resemble the Australian one.

Cer. almella n. sp.

11"—12". Head, palpi, and thorax slaty-whitish, densely irrorated with slaty-fuscous. Antennæ dark fuscous. Abdomen slaty-whitish, densely mixed with fuscous, in ♂ more blackish, with segmental margins pale ochreous; in both sexes on posterior margin of basal segment are two ochreous valve-like projections, ending in ♂ in a long, in ♀ in a short tuft of scales, one on each side of back, beneath which is in ♂ a large, in ♀ a small excavation or orifice in side of abdomen. Anterior legs pale slaty-grey, irrorated with dark fuscous, in ♂ internally black, with pale rings at apex of joints of tarsi; middle and posterior legs slaty-whitish, irrorated with slaty-fuscous, with a strong oblique black band at one-third before apex of tibiae, and joints of tarsi black at base. Forewings rather strongly dilated, hindmargin scarcely oblique, rounded; slaty-whitish, very densely irrorated with slaty-fuscous; a strong black nearly straight oblique transverse line near base from costa to inner margin; first line double, strong, black, from hardly beyond one-third of costa to before middle of inner margin, slightly angulated outwards a little below costa, lower half of its inner margin marked by a strong ridge of raised scales; second line double, black, faintly waved, from just before apex to just before anal angle, making a rather strong curved projection inwards below costa, and a rather indistinct sharply-acute angulation inwards above inner margin; halfway between first and second lines above middle of disc a transverse elongate-linear raised black mark, behind and beneath which is an indistinct blackish cloud, sometimes produced beneath to lower extremity of first line; hindmarginal line strong, black, broken by very small slaty-whitish spots about veins: cilia grey, intersected by a strong line of slaty-whitish scales before middle, and with tips and two lines of points before tips

slaty-whitish, immediately before each of which they are suffused with blackish. Hindwings pale clear ochreous-yellow, on upper margin towards apex suffused with dark fuscous; hindmarginal line dark fuscous; cilia pale ochreous-yellow, with a dark fuscous parting-line near base, and towards apex becoming suffused with smoky fuscous.

A very conspicuous insect. The singular orifices and valve-like arrangements at base of abdomen I conjecture to be auditory organs, from the analogy of other insects. Several specimens bred from larvæ feeding rather gregariously in silken nests on *Eucarpus cupressiformis*, near Parramatta in April; imago emerged from June to September.

MYELOIS Z.

Forehead smooth. Antennæ filiform, simple, in ♂ finely ciliated. Ocelli distinct. Labial palpi pointed, erectly ascending, terminal joint short. Maxillary palpi short or obsolete. Forewings of variable breadth, costa straight or slightly curved; hindwings rather broad. Forewings with 11 veins; 4 and 5 stalked or separate. Hindwings with 8 veins; 3 and 4 rising stalked from posterior angle of cell.

A large and rather heterogeneous group, occurring throughout the world.

- A. Forewings with a broad curved white subcostal band... 1. *subarcuella*.
 B. " " no white subcostal band ... 2. *cosmiella*.

Myel. subarcuella n. sp.

6½"—7". Head dark grey mixed with blackish. Palpi short, arched, blackish mixed with whitish-grey scales. Antennæ whitish, with dark fuscous rings. Thorax dark purple grey. Abdomen fuscous-grey, segmental margins and sides pale ochreous; anal tuft ochreous. Anterior legs purple-fuscous, irrorated with whitish, tarsi and apex of tibiæ blackish, tarsal joints with whitish apical rings; middle and posterior legs above purple-fuscous, irrorated with whitish, beneath ochreous-white, tarsi black with slender whitish rings at apex of joints. Forewings short, somewhat dilated, costa nearly straight, hind margin rather oblique, rounded; dark purple-fuscous, somewhat irrorated

with purple-whitish scales, especially towards hind margin; a broad, somewhat curved, white subcostal streak, sprinkled with purple scales, rising from costa a little above base, and ending on costa again a little before apex, enclosing a short narrow black costal space; apical extremity of subcostal streak margined posteriorly by a short broad oblique blackish band from apex of wing; first line hardly visible, purple fuscous, about $\frac{1}{3}$, angulated in middle; second line very indistinct, straight, double, dark purple-fuscous enclosing a paler central space, from extremity of subcostal streak to anal angle; a row of cloudy blackish spots on hind margin, generally very indistinct; cilia fuscous-grey, with purple-whitish points. Hindwings subhyaline, pale grey, darker at apex; hind marginal line dark fuscous-grey; cilia whitish-grey, darker at apex, with a dark-grey parting-line near base.

Two ♂'s from Blackheath on the Blue Mountains, in March.

Myel. cosmiella n. sp.

9". Head and palpi blackish irrorated with whitish, palpi whitish at base and internally. Antennæ dark fuscous with indistinct whitish rings. Thorax blackish-fuscous. Abdomen dull ochreous, suffused with fuscous at base of segments. Legs blackish, densely irrorated with whitish, tibiae with a black band before middle, tarsal joints with whitish apical rings. Forewings elongate, rather narrow, slightly dilated, hind margin rounded; blackish, very densely irrorated with whitish, except on each side of first line, where the black colour predominates for some breadth; first line represented by a rather broad white slightly curved transverse band, sprinkled with blackish scales, and with an indistinct central blackish streak in lower half; second line indistinct, double, black, rising from costa before apex, immediately making a strong angulation inwards, thence returning and continued to inner margin before anal angle; between first and second lines an indistinct double black spot above middle of disc: cilia grey, with many bluish-whitish points. Hindwings thinly scaled, whitish-grey, very narrowly darker grey at apex and along hind margin: cilia whitish, with a dark grey parting-line near base.

One ♂ from Melbourne,

ANNEASTIA Hb.

Forehead with blunt cone of scales. Tongue short or absent. No ocelli. Antennæ filiform, in ♂ more or less distinctly sinuate above basal joint, pubescent or ciliated, in ♀ simple. Labial palpi long horizontally porrected or obliquely ascending, second joint dilated above, terminal joint long filiform. Maxillary palpi short or obsolete. Forewings elongate, narrow, hindmargin very oblique; hindwings uniformly rounded, faintly indented. Forewings with 10 veins; 4 and 5 coincident. Hindwings with 7 veins; 3 and 4 long-stalked.

A not large, but universally distributed genus, the species of which frequent dry sandy places. Besides the one described, which is very conspicuous, I have seen two other Australian species, much more nearly resembling European forms, but not in fit condition for description.

Anor. mirabilella n. sp.

7"—7½". Head dark fuscous, ochreous at back, with a slender whitish line above each eye. Palpi twice as long as head, densely scaled, horizontally porrected, dark reddish-fuscous, beneath white at base. Antennæ fuscous, thinly whitish-scaled. Thorax ochreous-grey-brown, on sides brownish-crimson. Abdomen whitish-ochreous. Anterior and middle legs externally whitish, internally dark fuscous-grey; posterior legs white. Forewings rather elongate, not dilated, apex rounded, hindmargin oblique, rounded beneath; pale carmine, with a rather large oval white spot on middle of inner margin, blackmargined except on lower edge; cilia whitish, with a pale carmine basal line, and blackish at apex and towards anal angle. Hindwings pale fuscous-grey, suffused with pale ochreous towards base and at apex, with a rather large irregularly elongate sharp black patch on middle of inner margin, forming a continuation of the dorsal spot on forewings, when the wings are expanded; cilia pale ochreous.

The continuation of the markings of forewings over hindwings is a very unusual and curious circumstance in this group, and in conjunction with the exceptional character of these markings, causes a singularly exotic facies. Two ♂ s, near Sydney, in January.

HOMOROSOMA Curt.

Forehead with a blunt ridge of scales. Tongue strong. Ocelli distinct. Antennæ filiform, in ♂ with a short notch above basal joint. Labial palpi moderate, obliquely ascending, slender, somewhat compressed; terminal joint rather more than half as long as second, filiform, rather pointed. Maxillary palpi filiform, appressed. Forewings long, moderately dilated, costa faintly curved, more strongly before apex, hindmargin very oblique, almost straight. Hindwings narrow, pointed, flatly rounded, hardly indented. Forewings with 10 veins; 8 absent, 4 and 5 stalked. Hindwings with 7 veins; 3 and 4 unstalked from posterior angle of cell.

A small genus, occurring through Europe and Asia; the larvae feed in the flower-heads of *Compositæ*. The two species described are readily distinguished from each other by their size and different markings.

Hom. vagella Z., *Is.*, 1848, 868.

7½"—8". Head whitish, densely mixed with slaty-fuscous, especially on forehead. Palpi arched, dark slaty-fuscous irrorated with whitish. Antennæ dark fuscous. Thorax dark slaty-fuscous, irrorated with whitish. Abdomen ochreous-whitish, partially suffused with grey. Legs thinly ochreous-whitish-scaled above, dark fuscous beneath. Forewings extremely narrow, hardly at all dilated, hindmargin very oblique, slightly rounded; dark fuscous, towards costa blackish, densely irrorated throughout with slaty-whitish scales, coalescing to form a more or less distinct white irregular subcostal streak from near base to about two-thirds of disc, sometimes faintly streaked with brownish; a blackish circular spot near base in middle; first line tolerably strong, cloudy, blackish, from one-third of costa to a little beyond one-third of inner margin, strongly angulated outwards above middle, indistinctly margined basally with whitish; second line indistinct, blackish, not far from and nearly parallel to hindmargin, broken and shortly acutely angulated inwards below costa; at two-thirds of disc are two blackish obliquely placed dots above middle, lower nearer to base; cilia grey-whitish, with

two indistinct irregular slaty-grey parting-lines. Hindwings whitish-grey, apex darker, hindmarginal line suffused, dark fuscous; cilia whitish, with faint darker-grey parting-line near base.

The narrowest-winged species of the genus. Tolerably common in the Sydney district; also at Melbourne and Adelaide, from September to January.

Hom. distichella n. sp.

4"—6". Head, antennæ, and thorax pale greyish-ochreous; palpi slightly arched, externally dark fuscous, internally and beneath whitish. Abdomen ochreous-whitish. Anterior legs dark fuscous; middle and posterior legs ochreous-whitish. Fore wings rather short, tolerably broad, moderately dilated, hind margin very oblique, rounded; pale whitish-ochreous, strewn with coarse blackish scales; a broad brownish-ochreous streak along fold from base to anal angle, and a shorter, sometimes broader, one above it on disc; a rather large cloudy blackish dot on disc at two-fifths, and a second obliquely below it, much nearer base, on lower edge of fold; a straight row of about five or six similar dots crossing wing in a line from four-fifths of costa to anal angle, second from costa generally largest, elongate, next three close together, confused, sixth almost on anal angle; cilia ochreous-whitish. Hind wings pale grey, hind-marginal line broad, dark fuscous; cilia ochreous-whitish.

Differs from the *nimbella* group by the merging of the second line with the discal spots; allied rather to *sinuella* F., but superficially very different in appearance. Common and generally distributed in New South Wales, from Parramatta to Bowenfels, and on the Lower Hunter R., from January to March.

EPHESTIA, Gn.

Eph. dutella Hb.

This and the three following species are naturalised importations from Europe, and are too well known to need description.

Sydney, Parramatta; common in houses. The larva feeds on biscuits, chocolate, &c.

Eph. interpunctella Hb.

Sydney, Parramatta, common. The larva feeds in corn-bins, apparently especially on maize, in company with *Sitotroga cerealella*, doing considerable damage.

GALLERIDÆ.

GALLERIA F.

Gall. mellonella L.

Specimens of this insect are sent from Queensland, where it is considered destructive; the larva feeds in bee-hives on the wax.

ACHROEA Hb.

Achr. grisella F.

Sydney, Parramatta, Melbourne; common in February and March. The larva feeds in bee-hives on the wax, causing very great destruction if not checked; but I have also seen it very abundant in a fruit-shop in Sydney, which may indicate some versatility of habit.

ON THE GEOLOGY OF YASS PLAINS.

[SECOND PAPER.]

By CHARLES JENKINS, Esq., L.S., Yass.

Plate 17.

In endeavouring to describe some of the fossils enumerated in my former paper, I necessarily labour under the disadvantage of having at Yass no opportunities of making such comparisons, or at present the references, I could wish. Without assuming such special knowledge, as only a life exclusively devoted to Palæontology can give, I hope, however, by detailed drawings and descriptions, to place before you the specific nature of the different fossils in such a manner that, if my determination should be wrong, it may be at once apparent to those better qualified to judge than myself.

I propose, in the first place, to deal with those fossils which I either consider the more remarkable, or are well-known and regarded in other countries as characteristic of particular zones,

or such as specially characterise, by their number and variety, the strata in which they are found here.

I am naturally much assisted by Prof. Koninck's work, in which several of the Silurian species found in the Yass and Hume beds are described.

CHEIRURUS INSIGNIS. Fig. 8, Pl. 6.

This specimen so exactly coincides with the description of the *pygidium* of Prof. Koninck* in having four pairs of ribs, the last pair of which form a rudimentary spire following the direction of the axis, that there can be no doubt about its identity. All the species I have yet obtained agree in the above particulars; but the relative lengths of the lateral portions do not seem to be constant. The specimens of this part of the *Cheirurus insignis* are associated, chiefly in the lower portion of the Hume beds, with other portions of *Cheirurus* (Figs. 5, 6, 7; Pl. 6); but I have not been able to obtain a specimen in which the different parts are united.

BRONTEUS.

As there is some difference in the terms used by different writers in naming respectively the three principal segments of *Trilobites*, I may observe that I shall in my descriptions call the anterior portion the head segment, the middle portion the thorax, and the posterior portion the pygidium.

As the exact form of the head, and disposition of the eyes of this genus, do not appear to be well-known, I am fortunate in having several specimens from which these particulars can be obtained. The specimen of nearly a whole *Trilobite*, which has enabled me to give the restored Fig 5, has some of the ribs of the thorax overlapping and displaced, and part of the cheeks at the facial suture separated and removed. The position and size of the eyes are distinctly indicated. One eye is perfect, and, with a portion of the cheek, rests upon another part of the *Trilobite*. A perfect impression of the external portion of the cheek, belonging to a *Trilobite* of the same size and proportion, enabled me to complete the form of this part. The form of the

*Reserches, sur les Fossiles, Paleozoiques de la Nouvelle Galle de Sud, page 48.

head segment is nearly semi-circular, rather more than twice as broad as long, and almost flat. Anterior outline rather regularly curved. The external posterior angles pointed and acute. The concave-convex outline of the posterior margin of each cheek is interrupted by an angular tooth-like projection.

The Glabella is slightly raised posteriorly, depressed anteriorly. Broadest in front and narrowest at the second furrow at about a quarter the length of the glabella from the base—outline concave laterally to about 2 millimetres from the anterior margin, when it becomes slightly convex. Separated from the lateral portions, or cheeks, by a sinus 1 millimetre broad $\frac{1}{2}$ millimetre deep to about 2 millimetres from the anterior margin, after this the separation becomes gradually fainter and hardly perceptible at the very front.

There are four furrows on its surface counting from the base, the first entire, the second nearly so, the third and fourth arched to about $\frac{1}{3}$ of the width of the Glabella, and more deeply marked at their inner termination.

Surface of Glabella covered with concentric folds, the edges of which are about $\frac{1}{2}$ a millimetre apart.

The cheeks subtriangular, the inner and posterior margins of nearly equal length. The anterior longer. The eyes are sessile and somewhat reniform. Rather more prominent at the anterior third, and slightly raised above the other parts of the cheek. Facets not so large as those of *Phacops*. The spaces between the eyes and exterior margins of the cheek, occupied by three curved depressions radiating from the front, and by intervening slight elevations. The sinus and ridge nearest the eye being more curved and sharply defined than the others.

Three curved slight ridges concave exteriorly and radiating from the anterior corner extend from the inner margin of the cheek to the eye. The surface is covered with small folds, some being paralld to the anterior edge, and forming a border about 2 millimetres in width, others form a narrow border to part of the posterior margins, while those in the intervening space radiating, follow somewhat the outline of the eye. One

portion of the facial suture extends in an undulating curve from the upper interior corner of the eye to the outer anterior corner of the Glabella; the other portion from the posterior corner of the eye, extends downwards to the posterior outline of the cheek.

The Thorax contains eleven segments, the central portion or axis slightly convex and raised a little above the ribs, which are flat or nearly so. The segments of the axis are nearly straight, depressed anteriorly, the depression having a convex outline posteriorly. There is a linear groove near the anterior and posterior edges of the segments; the posterior groove of the one segment covers the anterior groove of that adjoining. Each segment is crossed by 10 to 12 folds ranged somewhat concentrically round a point in the centre of its posterior half. Separated from the lateral portions or ribs by a sinus 1 millimetre wide, sinus concave exteriorly in the centre, convex at the edges. Outline of axis convex exteriorly, width greatest in the middle.

The ribs are flat, and straight for the greatest part of their length, then curved backward, and terminate in a flat claw-shaped acute angle. In the straight portion there is a linear groove near the anterior to posterior edges, leaving a somewhat ragged margin. This depression is continued into the curved terminations.

As in the segments of the axis, the posterior linear groove of one rib covers the anterior groove of the adjoining rib.

The curved portion is shorter and sharper in the segments that are near the pygidium, and its commencement is marked on each margin of the ribs by a slight punctation.

The pygidium is nearly flat, slightly raised in the centre; semicircular for about two-thirds its length at the anterior third, sides nearly straight and parallel; anterior margins slightly projecting in the centre with a linear depression near the margin. Axis subtriangular, composed of three segments; component parts rather obscurely marked, except at the edges. Each part depressed anteriorly, and crossed by folds like the segments of the axis of thorax. Axis separated from the ribs, fifteen in number, by a sinus 1 millimetre wide. The central rib is the largest, that next the line of articulation of the thorax wider at the

extremity than the remainder. These ribs have the appearance of plaits folded from the outside towards the centre. The inner margin of each fold near the axis presents a well defined sharp edge, which becomes slight and almost insensible at the margin.

The surface is covered with three distinct series of folds; these divide the surface into three areas, in each of which one series appears more distinct than the others. The first area, counting from the external edge, extends to about 3 millimetres from the margin; the second zone has a width of about 4 millimetres; the third occupies the remainder of the surface.

In the last area the ribs are crossed by twelve or thirteen folds, at right angles to the direction of the ribs only in the centre rib. These have the appearance of being folded from the anterior outline. The next consists of four regularly curved concentric folds, appearing to be folded from the exterior towards the centre. In the external area the folds are less regular and form parts of curves of larger radii than the preceding. These appear also as if folded inward. These different series are not however confined to the areas specified, but extend to the other parts, though they are not then so distinct.

This species is certainly very distinct from the characteristic Devonian species, *Bronteus flabellifer*, though, from its fan-like pygidium, it well deserves the name. It appears to be more related if not identical with *Bronteus Partschi*, the pygidium of which is described by Professor Koninck.* Except in the actual size, the description of Professor Koninck, as far as it goes, applies well enough to the smaller specimens I have obtained. According to the same author, M. Barraude found in Bohemia *Bronteus Partschi* in the lower part of the Upper Silurian.

The specimen of *Bronteus* I have figured (figs. 4, 5, 6, and 8), are most abundant about the middle of the Hume beds, some few, however, I have obtained lower, and two specimens in the Yass beds.

In the specimens of different sized individuals, there is considerable variation in the proportions of the corresponding parts.

columella margin thickened and extending across the body whorl into a thin callus plate joining the upper part of the peristome.

Length $10\frac{1}{2}$, breadth $8\frac{1}{2}$ lines.

Hab., Diamantina River, Queensland.

I have named the species after its discoverer, Mr. William Alison, jun., of Wingadee, who presented two specimens (adult and young) to the Macleay Museum, Elizabeth Bay.

On some TERTIARY FOSSILS from Muddy Creek, Western Victoria.

By the Rev. J. E. TENISON-WOODS, F.G.S., F.L.S., Hon.

Corr. Mem. Lin. Soc., N.S.W.

Plates 20 and 21.

The following fossils were obtained from the tertiary beds on the banks of the Muddy Creek, a tributary of the Wannon River, about five miles from Hamilton in Western Victoria. The most of them were gathered for me by Mr. Samuel Pratt Winter, whose beautiful station of Murndal, on the Wannon, is not far from the locality in question. Some have been in my possession for more than sixteen years, and I would have published a notice of them long ago, but that I understood that all the miocene fossils would have been fully described ten years since by the Victorian Geological Survey. This expectation has been frustrated by the reduction of the geological staff of the colony, and now the only person engaged on Victorian paleontology is Prof. M'Coy, who, in the "Decades," is most ably and satisfactorily dealing with some of the more remarkable species. As a very long time must elapse before all the larger fossils are dealt with, I have thought it better to publish my own limited investigations on the very small ones. I do this, because I am convinced that the material at my disposal gives me peculiar advantages, especially as I have for the last four years been engaged in describing the small existing species of the south coast, and I fear risking the loss of the material altogether if I delay its publication any longer. If what I offer is incomplete, I trust geologists will excuse this incompleteness, in view of the

great necessity of doing something where so much has to be done, and where there are so few inquirers.

The fossils now described are all new and peculiarly interesting. They are not generally like the present Australian fauna, and they are not identical with any fossils of other countries. The resemblance of some of them to the common forms of the Italian and Vienna miocene is very striking. This resemblance has already been referred to by Prof. M'Coy, and he has perpetuated it by giving specific names which will serve to recall the European types. So far as I have examined, the fossils would incline one to imagine the sea to have been a warmer one than at present; but it would not be, as yet, a very certain inference to draw from the evidence, which is so incomplete. For the rest, I have noted in the diagnosis of each species such resemblances or peculiarities as are the most apparent, and I will only add that the structure, sculpture, and elegance of form of the fossil fauna of the Australian miocene far exceed anything on our coasts at the present day. I do not enter into the question of the age of the beds. The evidence, so far, is entirely in favour of a miocene horizon. But the miocene of Australia is represented by wide deposits of such thickness that the percentage of existing species in the uppermost and lowest beds must be widely different. The true value of the term miocene, as applied to South Australian formations, can only be appreciated when the relative position of the beds in different localities is established. Prof. Tate is of opinion that the Muddy Creek beds are the equivalents of the uppermost of the River Murray series. I regard them as below the Mount Gambier limestones, which is the opinion of the geologists of the Victorian survey. So far, however, no accurate survey has been made to determine the question, which the following paleontological remarks may help to solve. All dimensions in French millimetres.

TRITON PRATTII Pl. 21, fig. 15.

T.t. parva, tumide-fusiformi, turrata, solida, nitente: anfr. 7 (embryonal. 2, inclusis), rotundatis, liris spirulibus inaequalibus cinctis, costis obsoletis rugulosis, et undique crebre striatis, striis

longitudinalibus concinnis, minutis; varicibus convexis, latis, elevatis; apice obtuso, nucleo laevi, rapide crescente, conspicuo; apertura elliptica, intus dentata, peristomate producto, acuto, labio conspicuo, canali prælongo, angusto, recurvo. Alt. 9, lat. 5, alt. spiræ. 5 millim.

This is a small almost turretted species, very much of the character of all our Australian *Tritons*, and most like one which is peculiar to Australia, *T. Quoyi*, which however though one of the very small members of the genus, is much larger than this fossil. It has all the characters of the genus, the unequal spiral liræ all finely wrinkled, the obsolete ribs and the conspicuous varix round the mouth. It has two important marks of distinction, namely the smooth obtuse *Natica* like nucleus and the long narrow *recurved* canal. The mouth is also somewhat remarkable, as it is *Murex* like, dentate and almost entire, and there does not appear to be any posterior plait on the columella. For its size its markings are very perfect and neat. It is somewhat like *T. parvulum*, Michelotti, but is smaller than any living or fossil form known to me.

I have dedicated the species to Mr. Samuel Pratt Winter, whose station is not far from the Muddy Creek beds, and whose kindness and hospitality have enabled me to gain all the knowledge I have of them.

Prof. Tate regards this shell as a young *Ranella* belonging to the section in which the varices are not continuous. The species is allied to one from the Molluccas.

PISANIA TENUICOSTATA. Plate 20, fig. 6.

P. t. parva, anguste ovata, tenui, nitente, anfr. 5, (nucleo? decoll.) convexis, parum declivibus, crebre liris et tenuiter sed valide creberrime costatis, ita ut tota testa minutissime et eleganter reticulata appareat; costis tenuibus (in ult. anfr. 35), a liris quasi coopertis et ideo crebre granulatis; liris latis, planatis, approximatis, interstitiis æquantibus, interdum lirulis parvicribus interpositis; varicibus numerosis ultimo excluso 2 vel 3 in omn. anfr., latis conspicue liris; apertura ovata, labro varice incrassato, labio laevi, exacte definito, canali brevi vis recurvo. Long. 10, lat. 5.

This fossil is smaller than *Triton reticulatum*, Blain., of the Vienna basin, which is also a *Pisania*, though we have a living *P. reticulatum*, Adams, in our seas. The Muddy Creek fossil is much smaller or more ovate; is shining and decollated in all the specimens I have seen. The ornamentation is very elegant, arising from very close fine ribs (there being thirty-five in the last whorl), over which numerous close flat lines pass so as to completely cover them with granulea. There is only one varix on the last whorl, which is at the lip; there are two on the next and four on the next. On the fifth whorl of the spire, the ribs are scarcely granular, and the varices on one side of the spire follow one another nearly continuously. The aperture is rather long and the canal short and scarcely recurved. The columella lip is smooth, inconspicuous, and well defined.

FUSUS FUNICULATUS. Plate 20, fig. 1.

Testa parva, elongato-fusiformi, solida, parum nitente, spira quam apertura longiori, anfr. (nucleo incluso) 6, parum convexis et declivibus, carinis spiralibus 5 vel 6, latis, rotundatis, solidis cinctis, lineis quoque longit. inconspicuis, supra carinas non transeuntibus, sutura lata, haud impressu; nucleo laevi, polito, 2 anfr., apertura ovata, labro varice incrassato, intus lirato, labio reflexo, tenui, canali brevi, recurvo. Long $8\frac{1}{2}$, lat. $3\frac{1}{2}$; long. spire $5\frac{1}{2}$.

The fossil is small, elongately fusiform, the spire much longer than the aperture, solid, slightly shining. The whorls, including the nucleus, are six in number, slightly convex and sloping, girdled with from five to six solid, broad, rather raised rounded keels, between which there are longitudinal raised lines which are something like rather prominent lines of growth which do not pass over the keels. The suture is very broadly grooved but not deep. The nucleus is somewhat swollen and smooth, white and highly polished. The aperture is ovate, attenuated at the ends. The labrum is thickened by a varix slightly removed from the edge. It has liræ inside. The lip is thin, reflexed, and the canal is rather short but very distinctly recurved.

This anomalous shell includes some of the characters of *Fusus*, *Nassa* and *Columbella*.

PLEUROTOMA SAMUELI. Pl. 20, fig. 3.

P. t. elongato-fusiformi, parva, tenui, polita; anfr. 6, declivibus, in medio angulatis, nodosis et undulose striatis; nodis elevatis subquadratis, ultimo anfr. spiraliter striata et longitud. flexuose corrugato; apertura, angusta, elongata; labro acuto tenui, sinu lato profundo, canali longo, parum recurvo, sutura profunda. Long. 12, lat. 4, long. spiræ 7.

This very elegant species is very like *P. dimidiata* of the Paris basin and Vienna miocene, but it is smaller and the spiral liræ at the base are distant. It is a polished shell with whorls angular in the middle supporting a single somewhat distant series of coarse blunt somewhat square tubercles. These are exactly on the line of the sinus, and at each side the lines of growth curve away from it. The sinus itself is deep broad and somewhat quadrate. The aperture is long and round rather square posteriorly and the canal is long and only slightly curved.

I have named the shell after the christian name of Mr. S. P. Winter, from whom I have received so much assistance in getting fossils from these beds.

DAPHNELLA GRACILLIMA, mihi (Sec. Proc. Roy. Soc. Tas. 1876, p. 106).

Pl. 20, fig. 10 is a representation of a much worn specimen of this fossil, which is very common at Muddy Creek. The specimens found there are much more solid and thick than those of Table Cape, Tasmania, and the spiral groove less distinct.

PLEUROTOMA MURNDALIANA. Pl. 20, fig. 5.

P. t. fusiforme-turrita, tenui, nitente; anfr. 9, planatis, pyramidalis, carinis tribus, suciferis ornatis, prope apicem in medio granulosis; liris parvis inter carinas et sulcos insignitis; apertura elongata, angusta, canali prælongo, recto; basi concava, lirata; et cancellata, sinu profundo, postico, supra carinam sito, labro tenui, columella encausta, labio exacte definito. Long. 17, lat 6; long spiræ 11, long aperture canali incluso 7.

This neat little species is distinguished by its long canal and pyramidal spire. The whorls are flattened, but have three

raised rather broad keels, which are grooved upon the summit. It is upon the median keel the sinus is, and it becomes granular near the summit, with a rather faint but regular line of granules. Between the keels there are fine thread-like liræ, sometimes they are seen in the middle of the groove on the summit of the keel. The canal is slender and long, and even slightly recurved. The base is concave and cancellated. The apex is rather blunt, with a solid smooth nucleus of two whorls. The species has no very near ally, either recent or fossil. It slightly resembles *P. vermicularis* Grateloup from the Piedmont and Vienna miocene. It is also a little like the living *P. annulata* Reeve, whose habitat is unknown. Rare in the Muddy Creek beds.

MANGELIA BIDENS. Plate 20, fig. 2.

M. t. parva, ovato-fusiformi, turrila, spira, apert. superanti, solidiuscula, hauri nitente; anfr. 6, parum declivibus, superne angulatis, crebre, flexuose, inconspicue costatis et distanter spiraliter liratis, supra angulum creberrime striatis et costis ibi curvatis, nucleo ($1\frac{1}{2}$ anfr.) laevi, apertura anguste ovata; labro varice valde incrassato, intus et ad marginem linea granulorum dentato; sinu profundo, lato, canali brevi, lato, viz recurvo, labio definito, inconspicuo.

A small ovately fusiform shell, whose spire exceeds the aperture slightly, rather solid, not shining. Six whorls, slightly sloping, angular above, with many flexuous inconspicuous ribs and distinctly lirate. Above the angle it is closely grooved, and the ribs are curved. The mouth is very peculiar, on the outer lip so produced as to give the fossil the appearance of a *Strombus*; it has a thickened flexuous varix, and there are two rows of teeth, one on the edge and one within. The sinus is deep and thickened, and very conspicuous. The canal is broad, short, and only slightly recurved. Altogether the form is very different from any of our numerous species of this genus, though the general character of its ornamentation is the same. Its relations to any European fossil seem distant.

DRILLIA TREVORI. Pl. 20, fig. 4.

D. parva, elongato-fusiformi, solida, nitente, spira quam apertura longiori; anfr. 8, parum convexis, longitudinaliter costatis, spiraliter

crebre, sed regulariter et æquidistanter striatis, superne concinne marginatis; costis brevibus, latis, rotundatis, in medio elevatis, ultimo anfr. evanidis; apertura angusta, elongata, peristomate valde incrassato; sinu profundo, obliquo, margine tumido, labro solido, canali brevi, labio encausto, exacte definito. Striæ incrementi valde flexuosæ. Alt. 11, lat. 4, long. spira 7.

This interesting little species which does not appear to be very common at Muddy Creek, bears considerable resemblance to our existing *D. Beraudii*, which is common on the S. E. coast of Tasmania. It is a fusiform shell with the spire much longer than the aperture, the whorls are studded with many short blunt tumid ribs, and regularly spirally grooved; they are very distinctly margined above with a rather broad flat space which is thickly covered with curved striæ. The ribs disappear on the last whorl, but there are very distinct undulose lines of growth instead. The aperture is long and narrow with a thickened raised margin almost all round it. The sinus is deep and oblique with a swollen edge. The outer lip is thickened and the inner one is enamelled and exactly defined. The canal is short, straight, and truncate. The nucleus is smooth and shining, of two whorls.

I have dedicated this fossil to Mr. Trevor Winter, who obtained the greater part of this collection for me when temporary illness prevented me from visiting the beds in person. I am not aware of any fossil species nearly resembling it.

CONUS RALPHII. Pl. 21, fig. 14.

C. parva, anguste ovata, spira elata, solidiuscula, nitente; anfr. nucleo (2) incluso, superne concinne striatis, ad angulum anguste marginatis et coronatis, granulis quadratis; ultimo lineis incrementi insignito, basim versus spiraliter declivi striato, apertura angusta, nucleo lævi, tumido. Alt. 10, lat. 5.

Shell small, rather narrowly ovate, with a somewhat produced spire rising in stages, which are very distinctly granular, the granules being square and large. The upper part of the whorls is grooved with a few lines, and this grooving extends over the angle of the last whorl, causing a kind of granular margin.

There is no other ornamentation on the body-whorl, except about ten spiral striæ near the base, but the lines of growth are very apparent. The species is like the Vienna miocene *C. extensus* Partsch in its young stage, but in that shell the spire is more acute and longer. In our fossil, the upper part of the whorl near the suture is faintly channelled. The granules are also different, and the anterior striæ are more numerous and finer. *Conus dujardini* is like it in form, and *C. antediluvianus* has the corona more marked with a deep sinus near the suture. Both the latter belong to the Vienna miocene. There is nothing at all like it in the Paris basin; and we have nothing very similar existing in Australia but *Conus carmeli*, mihi, which has the two last whorls only coronate, but is distinctly grooved all over, and is broader in proportion to length. I have dedicated this interesting specimen to Prof. Ralph Tate.

NATICA WINTLEI, mihi, var. *HAMILTONENSIS*. Plate 21, fig. 8.

Testa parva, late ovata, solida, polita, anguste umbilicata; anfr. 3; *rotundatis, rapide accrescentibus, striis incrementi subregulariter tenuiter corrugatis; apertura semilunari, labro acuto, columella postice plus minusve callosa; umbilico uno sulco lato, corrugato, insignito, apice viz prominulo. Diam. et alt. 8.*

A common fossil at Muddy Creek, mainly distinguished by its small size. It is polished with very faint signs of the lines of growth. The callosity is not conspicuous and confined to the upper part of the columella. The umbilicus is narrow, with a broad corrugated groove. The aperture is semilunar. The outline of the shell is diagonal. It cannot be said to have any peculiar or marked features, but it does not resemble any in the Vienna or Paris basins and must mainly be distinguished by its size, the moderate callus and the very slightly exerted spire. In deference to the opinion of Prof. Tate, I have referred this species to my *Natica Wintlei* described by me in the Proceedings of the Royal Society of Tasmania, for 1875, p. 23. It is generally smaller and more globose than the type referred to.

ANCILLARIA SEMILEVIS. Pl. 20, fig. 7.

A. parva, elongata, fusiformi, solida, nitente, spira apert. æquanti; anfr. 5½ *angustis, encaustis, ita ut sutura et structura sint occultis;*

in ultim. balteo mediano, lato, duobus angustis balteis validis antice marginatis; apertura, elongata, lata; labro tenui, apice acuto. Long. 16, lat. $5\frac{1}{2}$.

Rather common. A small narrow somewhat acute species differing in this regard in a marked manner from our living *A. australis* which is short and stout and *A. mucronata* which is blunt and mucronate. The spire is covered with enamel so as almost to obliterate the suture. In the last whorl the median belt is rather broad. It is margined anteriorly with one narrow thick cord and one broader and less distinctly defined. Posteriorly there is one broad belt whose limits are not easily seen as the suture is so indistinct. The outer lip is thin and the aperture broad. Behind, the columella is twisted and the inner lip is very indistinct. Fossil *Ancillaria* are not uncommon in the Vienna and Paris basins, but this small species is more narrow and acute than any of them.

Prof. Tate remarks that the species is commonly about $\frac{1}{4}$ of an inch long, and that some of the specimens show the body whorl to be coloured a violet brown.

NASSA TATEI. Plate 21, fig. 13.

N. parva, ovata, spira quam apert. longiori, subturrita, solida; anfr. 7, (4 embryon. lævib.) convexis, conspicue costatis et liris sub latis, regularibus, distantibus, clathratis; interstitiis lineis incrementi conspicue corrugatis; costis (alt. anfr. 12) acutis, subelevatis, apertura ovata, intus lirata; labro varice incrassato, labio conspicuo, reflexo, expanso, plica postica munito; canali brevi lato profundo; recurvo. Alt. 7, lat. $3\frac{1}{2}$.

In this small species there are seven whorls; the four apical ones being smooth, the rest cancellate, with numerous sharp raised ribs and transverse flat liræ. The interstices are rather corrugated with the lines of growth. The mouth is large, with a broad swollen varix on the labrum. The inner lip is expanded, with a conspicuous posterior plait. The siphonal notch is deep, broad, and abruptly recurved, and the throat is lirato. The shell is in form like our existing *Nassa compacta* in size and shape, but that shell is granular; this is cancellate. It is much nearer to

Müller's *Nassa incrassata* in form but smaller and coarser about the mouth, and with a columellar tooth. *N. incrassata* belongs to the Vienna miocene. It is also very near Deshayes *N. truncata* of the Paris basin.

CANCELLARIA VARICIFERA. Pl. 21, fig. 12.

O. t. parva, ovata, spira elata, subacuta, varicifera, solida, concinne sculpta; anfr. 5 (embryon, $1\frac{1}{2}$ levib.), convexis, longitudinaliter costatis, et liris regularibus, distantibus cancellatis, undique præterea longit. tenuè regulariter crebre striatis; costis validis (ult. anfr. 12), declivibus, undulosis, elevatis, conspicuis, acutis; liris æqualibus distantibus, planatis, supra costas transeuntibus, sed non nodosis, sutura profunde impressa; apertura ovata, intus lirata, antice canaliculata, labro tenui, columella regulariter triplicata; varicibus latis elevatis, rotundatis. Alt. 9, lat. $4\frac{1}{2}$, long spiræ 5.

This shell does not appear to be uncommon at Muddy Creek. In its style of ornamentation it is much like many Australian forms, but we have no living species with varices. In this respect it is very near *O. Bellardi*, Michellotti, of the Italian miocene and Vienna basin (*Descrip. des Fossiles Miocene de l'Italie septent.*, p. 225); but in that species the plaits on the columella are irregular. Our shell is smaller, thinner, less acute, and the varix at the mouth is less pronounced. The longitudinal ribs are numerous, acute, and somewhat undulating. Where they are crossed by the liræ they are not nodose, and the liræ themselves are distinct, equal, flat, not nearly so conspicuous as the ribs, and regular, only that sometimes there is a smaller one in the interstices between the larger ones. Below the columella the mouth is channelled and the throat is lirate.

CERTHIUM CRIBARIOIDES. Pl. 20, fig. 14.

O. t. eleganter turrilissima, nitente, gracili, anfr. 14, sensim, accrescentibus, rotundatis, elegantissime clathratis, liris spiralibus 4, liris longit. paviorib. supra spiral. transeunt. et ibi nodosis; nucleo? (decoll.) sutura late impressa, basi planata, spiraliter striata, uno funiculo insignita, ad peripheriam angulata, apertura semilunari, labro tenui, canali contorto, recurva. Alt. 19, lat. $4\frac{1}{2}$,

This fossil is a very interesting and new form, differing completely from every species of the Paris or Vienna basins. It is very beautifully latticed and gracefully slender, in a way to which I am sorry to say the figure does but scant justice. It is very like *C. cribarium*, S. Wood (See *Monograph of Crag Mollusca* in the Paleontographical Society's publications, 1848, p. 71). In the diagnosis Mr. Wood says that the shell is ornamented with four to five elevated transverse ridges and decussated with lines of growth. The base is smooth. In our fossil the base is also smooth, except for one elevated ridge near the angular edge, but the spiral ridges on the whorls are crossed by distinct fine raised riblets, giving rise to a very elegantly latticed pattern. The canal is also very much twisted and recurved. Altogether it is a very perfect representation of *C. cribarium* in our Australian tertiary beds.

CERITHIUM APHELES. Plate 20, fig. 15.

C. t. elongato-turrita, subulata, tenui, sordida, parum nitens; anfr. 15—18, parum convexis, medio obsolete carinatis, et costatis, varicibus inconspicuis paucis insignitis, undique regulariter spiraliter striatis. Striis infra carinam distantibus, interstitiis planatis; supra carinam vero, crebris, interstitiis funiculatis. Anfrac. spiræ angulatis et costatis; nucleo, 3 anfr. lævi. Sutura lata, planata, marginata. Apertura orbiculata; labro tenui; columella gracili, contorta; canali longo, tenui, recurvo. Basi concava, striata, periphæria lamellosa. Long. 20—30, lat. 6—8.

This peculiar form of *Cerithium* is very common at Muddy Creek and at Table Cape; but in the latter locality it reaches a much larger size. It may be said to be the commonest form of *Cerithium* and almost the commonest fossil. Its distinguishing features are that it has only obsolete ribs which are scarcely perceptible by more than a somewhat rugose surface, except on the upper half of the spire; it has occasional varices, which are not very conspicuous, and the whole surface is spirally grooved. There is a kind of obscure keel on the lower whorls which becomes more marked on the upper ones; below this the striæ are distant and rather broad, above they are close, fine, and the

interstices are like little threads, while below the keel they are flat. The mouth is round, the labrum thin, base striate, concave, periphery lamellose, produced, canal long, slender, recurved, suture broad, flat, margined, nucleus of three whorls, smooth.

We have no *Cerithium* at all like this in our Australian Seas, and I know of no fossil form near it.

TRIFORIS WILKINSONI. Pl. 20, fig. 9.

T. elongata, pyramidata, turrita, tenui, parva, polita; anfr. 12, declivibus, convexis, 4 lineis granulorum cinctis; sutura canaliculata; embryon. 3 lœvibus, rotundatis, apertura quadrata, basi planata, unisulcata, radiatim striata, canali brevi, recurvo. Alt. $7\frac{1}{2}$, lat. 2.

Shell elongate, pyramidal, turretted, thin, small, polished, with 12 sloping convex whorls, girdled with four lines of granules, suture slightly canaliculate. Embryonal whorls 3, smooth and rounded, aperture quadrate, base flattened, with one groove and radiately striate. Canal short, recurved.

This species is a good deal like Australian and Tasmanian forms, except that it is much more turretted and is more granular, and yet the granules not projecting. I have dedicated it to Mr. C. S. Wilkinson, F.G.S., Government geologist for N. S. Wales, who surveyed much of the miocene district near Cape Otway, and published valuable reports on the subject.

TRIFORIS SULCATA. Pl. 20, fig. 12.

T. t. elongato-pyramidata, turritissima, tenui, nitente, anfr. 24, planatis, regulariter costatis, ad suturam uno funiculo spiraliter insignitis et duobus sulcis inæqualibus, spiralibus cinctis, costis latis, parum elevatis; apertura quadrata, labro tenui; basi planata, undulose striata; nucleo (2 anfr.) lævi, inconspicuo. Long. $33\frac{1}{2}$, lat. 5.

This very beautiful species of *Triforis* is very distinct from any living or fossil. It is very elegantly pyramidal, with numerous whorls, which are rather flat and ornamented with numerous inconspicuous depressed broad ribs. At the suture there is a rounded spiral line, and, in addition, there are two spiral

sulci, one rather broad, shallow, and flat in the centre, and a narrower one above. The number of whorls, and the ornamentation, make it very beautiful and graceful. It has some faint resemblances in size and number of whorls to *Oerithium inversum*, Deshayes, of the Paris basin, but the differences are great. It has no living congener at all like it.

TURRITELLA TRANSENNA. Pl. 20, fig. 8.

Testa parva, pyramidata, turrita, tenui, fragili, nitente; anfr. medio angulatis, 5 carinis cinctis (2 magnis, 3 parvis alternantibus) et costulis numerosis declivibus, supra carinas non transeuntibus clathratis; periphæria angulata, marginata, et bilirata, basi planata, spiraliter lirata, tenuissime transversim striata, margine, costata, granulata; apertura quadrata, antice conspicue producta et angulata. Long. $8\frac{1}{2}$. lat. 3.

Shell small pyramidal, turretted, thin, fragile, shining, whorls angular in the middle girdled with five keels (two large and three small alternating), the interstices finely latticed with numerous small somewhat sloping ribs which do not pass over the keels. The periphery is angular, and margined with a double line of small keels. The base is flattened, has spiral liræ crossed with very fine striæ, having a granular keel at its edge. The aperture is quadrate, being very much produced and angular at its outer edge.

I am not acquainted with any fossil *Turritella* latticed in the peculiar manner seen in this species. *Turritella tasmanica*, Reeve, is, however, like it, but the suture is not so strongly marked or impressed, and the cancellation is not nearly so pronounced. The latter is a species very common both in Tasmania and South Australia.

TURRITELLA PLATYSPIRA. Pl. 20, fig. 13.

Testa acute pyramidata, turrita, tenui, polita; anfr. 12—15, planatis, 3 carinis spiralibus inconspicuis, æquidistantibus, et uno sulco lato, haud profundo, antica, cinctis; lineis incrementi valde flexuosis, vix visibilibus, sutura angusta, parum impressa; nucleo 2 anfr. rotundatis; apertura subquadrata, columella marginata. Long. 11, lat. 3.

This is a very common fossil at Muddy Creek, and is always found of small size. It differs from the two small *Turritella* of Table Cape, Tasmania, in the almost smooth whorls, garnished with three very inconspicuous keels and a broad, shallow groove at the lower part of each whorl. *T. Warburtonii*, mihi, has five keels, *T. Sturtii*, mihi, has the keels granular. The latter are both abundant at Table Cape, and about the same size. In the larger specimens of this fossil (which is also distinguished by not being decollated) one notices other small faint liræ in the last whorl, especially below the groove. I believe, also, that the outer lip had a deep sinus.

THALOTIA EXIGUA. Pl. 20, fig. 11.

T. t. parva, tumide conica, spira elata, solida; anfr. nucleo inclusio 7, planatis, lineis 5 granulorum cinctis; sutura vix impressa; apertura quadrata, columella recta, fovee antice lirata, incrassata; basi spiralius granulosa; nucleo 1 anfr. lævi, nitente. Long. $6\frac{1}{2}$, lat. $3\frac{1}{2}$.

This fossil is very like the common *Thalotia conica*, Gray, of the south coast, except that it is very much smaller and has the aperture thicker in proportion. There are rows of granules in each whorl, and these are small, leaving spaces in which there is sometimes a fine raised line. There is another fossil *Thalotia* in the Tasmanian tertiary beds.

MINOLIA STRIGATA. Plate 21, fig. 7.

M. turbinato-conoidea, parva, tenui, nitente, strigis rufis aliquando insignita, late, perspective umbilicata; anfr. 5, medio conspicue carinatis, superne angulatis, corcnatis, undique distanter striatis; inter coronam et suturam late planatis; lineis incrementi declivibus, subtilissimis; granulis coronæ latis, acutis. Ultimo anfr. ad peripheriam angulato et carinato; basi lævi, planata; umbilico granulis conspicuis marginato, intus corrugato. Apertura vix integra, orbiculata. Alt. $5\frac{1}{2}$, diam $6\frac{1}{2}$.

This very pretty little species which often preserves its former coloring in faint reddish streaks is rather common in the Muddy Creek beds. It in some respects resembles our *M. vectiliginosa*, Menke and *M. angulata*, Adams. The main difference is the coronate

angle at the upper part of the whorls where they become flat to the suture. The umbilicus is margined with a conspicuous beading of rounded granules. It is sufficiently related to its Australian congeners to entitle it to the name of being Australian or allied to our living fauna, but I cannot find anything like it amongst the fossils of Europe or America.

LIOTIA LAMELLOSA? mihi. Plate 21, fig. 5.

L. t. orbiculata, solida, ubique conspicue clathrata, costis longitudinalibus supra costas spiralib. transeuntibus, et ibi cucullatis, interstitiis crebre, eleganter, longitudinaliter liris. Anfr. 4, sensim accrescentes; apertura varicibus duobus valde incrassata et bilabiata; umbilico parvo; apice planato, levi. Alt. 5, diam. $6\frac{1}{2}$.

This species is not uncommon at Muddy Creek. It is very close to *Liotia Australis*; and I question very much if it be distinct from the species described by me as *L. lamellosa*,* from the Table Cape beds. The latter, however, was only half the size of this. Its general character is decidedly near to many Australian forms. One peculiarity in it is the two varices round the aperture. They are close, rather thin, and sculptured like the whorls.

I append Prof. Tate's note on this fossil. He says, "This may be your species of Table Cape, but it is not identical with the living one of the name. The differences observable between the now living examples and the fossils are the subquadrate outer whorl, more depressed form and more numerous transverse costæ of the living. More than twenty fossil examples agree in the rounded outer whorl and more open tessellated ornament. As the species was instituted for the fossil form the recent allied should be renamed." This suggestion I think I would provisionally, at least, adopt and name the recent species *Liotia subquadrata*. The species was inadvertently omitted from my "Census of Tasmanian shells."

SOLARIUM ACUTUM. Pl. 21, fig. 11.

S. t. parva, depressa, discoidea, tenui, nitente; anfrac. 4, omnino planatis, liris, ad margines duobus liris majoribus granulosis

* Proceedings Roy. Soc. Tas. 1876, p. 96.

insignitis; ad peripheriam acutis; basi in medio conspicue convexa, tenuiter lirata; umbilico costulis et liris granulosis in lineis 4 vel 5 marginata. Apertura transversim ovata. Alt $1\frac{1}{2}$, diam. 6.

This fossil is not very common. It is easily distinguished by its very small size and depressed form and very acute periphery, where the edge of the shell is produced into a sharp projecting keel. The upper surface is distinctly lirate, and the edges of each whorl margined with rather broad granular lines, two or three in number, the central one where there are three, being much smaller. The under side is abruptly convex in the middle, and faintly lirate. The umbilicus is broadly margined with three to five spiral lines of granules or riblets, varying in size and forming a very elegant pattern. In the figure of this shell on Plate 21, the side view and base with the umbilicus are represented. The species is not like any existing or fossil, its nearest representative is *S. millegranum*, Lamarck. Prof. Tate informs me that this species reaches nine-tenths of an inch in diameter, and that then the ornament is slightly different.

SOLARIUM WANNONENSIS. Pl. 21, fig. 10.

S. l. parva, discoidea, superne planata, infra parum convexa, nitente; anfr. $3\frac{1}{2}$, undique striatis et granulosis, sed utrimque moniliferis. Sutura canaliculata; basi oblique transversim striata, umbilico tribus lineis granulis majoribus circumornato. Apertura orbiculata, peristomate undulato, antice et postice alato. Diam. $3\frac{1}{4}$, alt. 1.

A small flat discoid shell with a canaliculate suture and the whorls bordered at each side with a line of granules besides being striate and granular throughout. The upper surface is flat and the lower slightly convex with smaller granulations and besides the spiral striae a very close series of oblique radiating striae. The lip is undulating from the raised liræ of the whorls being hollow underneath. The aperture is perfectly round, but the peristome is spread at the columella above and below into a kind of aliform expansion. The umbilicus is margined with three rows of large granules and is channelled inside each whorl. The species is very like *S. canaliculatum* of Lamarck only much smaller.

Professor Tate informs me that he has several specimens from the Murray River, where it doubles the size of the figured specimen.

ADEORBIS ASTER. Pl. 21, fig. 6.

A. t. minuta, discoides, superne planata, subtus convexa, late, perspective umbilicata, nitente; anfr. 3, unilulose striatis, ad peripheriam acute angulatis et lamellis latis denticulatis armatis, subtilus medio obtuse carinatis, lævibus; nucleo depresso, umbilico haud ornato.

This is a minute discoid shell, which is flattened or even depressed above and very convex below. It has a very wide and solarium-like umbilicus, which has no granules or ornamentation, and the base is convex with an obtuse keel. The edge of the whorls is very acute, having broad serrated spinous lamellæ. It does not appear that there is any fossil or existing species like it.

ADEORBIS ACUTICARINATA. Pl. 21, fig. 9.

A. t. parva, discoides, tenui, nitente, depressa; anfr. 4, acule multicarinatis, magnis et parvis alternantibus, sed in ultimo tantum; spira 2 præcipuis insignitis, sutura late concava et tenui striata; apertura orbiculata; umbilico lato, perspective, profundo, corrugato. Diam. 4, alt. $1\frac{1}{2}$.

There is a fossil in the Norwich crag which is something like this shell in its general form—*A. tricarinatus*, S. Wood (Paleontographical Society's Publication for 1848. *Monograph of Crag Mollusca*, by Searles Wood, p. 138). *Turbo sulciferus*. Lamarck, from the Paris basin, also resembles it. It is a small discoid shell, very smooth and shining, with between seven and eight sharp keels (four large, and three or four small) on the last whorl, and two on the spire. Between the keels the shell is deeply hollowed. The suture is in a broad groove, which is striated. The aperture is not entire, but almost united; the umbilicus is broad, perspective, and corrugate. I am not acquainted with any shell at all like it in the Australian seas.

TROCHITA TURBINATA. Pl. 21, fig. 1.

Tenta turbinata, tenui, haud nitente, opaca, anfr. $1\frac{1}{2}$, rotundatis rapide crescentibus, lineis incrementi parum corrugatis et tenuiter striatis; apice exserto; apertura suborbiculata, labro tenui, colu-

mella lamellosa, expansa, conspicuus concava, radiatim sulcata, postice reflexa, umbilico parvo formanti. Diam. $9\frac{1}{2}$, alt. 8, long. apert. $6\frac{1}{2}$, lat. $5\frac{1}{2}$.

A turbinate thin shell, opaque and not shining, with $1\frac{1}{2}$ rapidly increasing whorls which are slightly corrugated here and there and finely striate with the lines of growth, apex exsert, aperture sub-orbiculate, labrum thin and extended, columella lamellose, expanded, conspicuously concave, radiately sulcate, reflexed posteriorly so as to give rise to a narrow umbilicus above.

This *Trochita* seems very distinct from every fossil form because of its few rounded turbinate whorls. It is quite different from our Australian species, which is depressed. It occurs at Table Cape as well as the Muddy Creek.

TORNATINA INVOLUTA. Pl. 21, fig. 4,

The specimen figured, which was the only one I have seen, has been crushed by accident since the drawing was made, so that I am unable to furnish any details, except that which the figure affords.

LEDA INCONSPICUA, Reeve. Plate 21, fig. 3.

This shell is described by Reeve as from Australia, but I am not acquainted with it from anything but his description and figure. It is not known to collectors in New South Wales, Tasmania, or New Zealand. The fossil form corresponds so exactly with Reeve's species that I cannot separate them. Prof. Tate thinks the species cannot be distinguished from *L. crebre-costata*, described by me in Proc. Roy. Soc. Tasmania, 1876, p. 112.

LEDA HUTTONII. Plate 21, fig. 2.

L. t. parva, depressa, tenui, fragili, polita, transversim elongato pyriformi, concentricè rugose irregulariter striata et late sulcata, latere postico valde producta, et parum oblique truncato, angulato, angulo obtuso, area postangulari sulcata; latere antico brevi, rotundato, dentibus numerosis acute angulatis.

The peculiar feature of this fossil is the length to which the posterior side is produced and its very slightly oblique obtuse end. The concentric striæ are irregular and appear to be

derived from the lines of growth only. The shape of the shell is depressed and flat, and the teeth are numerous and very minutely angular. It differs from all our living species.

The above thirty species is rather less than half those collected by me. I propose returning to the description of the rest in the course of a month or so. The most of the figures are already drawn on stone, and the diagnosis will receive my earliest leisure. It will be observed that I do not touch on the *Marginellids* which at present occupy the attention of Prof. Tate, who has written a most interesting memoir upon them.

EXPLANATION OF PLATES 20 AND 21.

Plate 20.

- Fig. 1.—*Fusus funiculatus*.
 „ 2.—*Mangelin bidens*.
 „ 3.—*Pleurotoma Samueli*.
 „ 4.—*Drillia Trevorii*.
 „ 5.—*Pleurotoma Murndaliana*.
 „ 6.—*Pisania tenuicostata*.
 „ 7.—*Ancillaria semilævis*.
 „ 8.—*Turritella transenna*.
 „ 9.—*Triforis Wilkinsonii*.
 „ 10.—*Daphnella gracillima*.
 „ 11.—*Thalotia exigua*.
 „ 12.—*Triforis sulcata*.
 „ 13.—*Turritella platyspira*.
 „ 14.—*Cerithium cribarioides*.
 „ 15.—*Cerithium apheles*.

Plate 21.

- Fig. 1.—*Trochita turbinata*.
 „ 2.—*Leda inconspicua*.
 „ 3.—*Leda Huttonii*.
 „ 4.—*Tornatina involuta*.
 „ 5.—*Liotia lamellosa*.
 „ 6.—*Adeorbis aster*.
 „ 7.—*Monilea strigata*.
 „ 8.—*Natica, Wintlei* var. *Hamiltonensis*.
 „ 9.—*Adeorbis acuticarinata*.
 „ 10.—*Solarium wannonensis*.
 „ 11.—*Solarium acutum*.
 „ 12.—*Cancellaria varicifera*.
 „ 13.—*Nassa Tatei*.
 „ 14.—*Oonus Ralphii*.
 „ 15.—*Triton Prattii*.

CONTRIBUTIONS TO THE ZOOLOGY OF NEW
GUINEA.

PARTS I AND II.

By E. P. RAMSAY, F.L.S., Curator of the Australian Museum,
Sydney.

Containing a list of the Mammals (part I) and Birds (part II) obtained during Mr. Goldie's second Expedition to New Guinea, collected by Mr. Goldie, the leader of the Expedition, and Mr. Alex. Morton, a collector from the Australian Museum, with descriptions of some new birds recently forwarded to the Museum by Mr. Kendal Broadbent, from the same localities.

In May, 1877, the Trustees of the Australian Museum despatched one of their collectors, Mr. Alexander Morton, to New Guinea; an opportunity having offered for him to accompany Mr. Andrew Goldie, who was starting to explore the South Eastern portion of that great island, on behalf of R. B. Williams, Esq., of Holloway Place, London.

The following notes, then, are on the collections made by Morton, and most of the remarks on the localities and habits of the birds are from his note book.

Mr. Goldie has also very liberally placed at my disposal the very large collections of mammals, birds, and reptiles made by himself and his collectors, Messrs. Shaw and Blunden, which is without doubt the largest collection of Natural History and Ethnological specimens yet made in those parts.

Mr. Ingham and Mr. Kendal Broadbent have also been collecting on the South East Coast, and as a portion of their collections has been forwarded to me, I am enabled to enumerate a few additional species; a full account of this collection will be given in another paper.

Mr. Goldie's collection is by far the most important yet made on the South East Coast; and although not containing many new species, yet from the large number of specimens which it contains,

I am enabled to throw some light on the distribution of the species in that district; and in this respect, I have also found Morton's notes of great interest as to localities, and other details respecting the habits of the birds in his collection.

Mr. K. Broadbent, having succeeded in getting a considerable distance inland, enables me to add some important new species to the list; the total number of birds examined amount to about 2,500.

Very few fishes, and only two or three reptiles were obtained; amongst the latter, only one, which I believe to be new, a fresh water tortoise belonging to the genus *Ohelodina*.

The fishes, reptiles, and remarks on the Ethnological collection, which is very extensive, I shall have for another paper. The first part of the present communication contains a list with remarks on the mammals, the second is devoted to the birds.

PART. 1. MAMMALS.

1.—*SUS PAPUENSIS*, Gray.

The wild Pig is quite distinct from those now usually kept in domestication by the natives, but the young are sometimes caught, and when tamed, allowed to run about the villages. They are longitudinally striped with brownish yellow.

2.—*CANIS FAMILIARIS*, var. *PAPUENSIS*.

The dogs used by the natives are of various colors, usually yellowish with short ears, and small brushy tail. They have the peculiarity of being unable to *bark*, properly so-called; but this deficiency is fully compensated by the propensity of uttering a most dismal howling at most inappropriate times. The specimen sent down by Mr. Goldie in spirits unfortunately arrived in a very bad state, but Mr. Morton and Mr. Broadbent inform me that the usual height is about 12 to 15 inches.

3.—*PTEROPUS CONSPICILLATUS*, Gould.

This species is apparently common towards South Cape and at Coutance Island, frequenting the fig trees, on the fruit of which they usually feed.—(*Goldie, Morton, Broadbent*).

4.—RHINOLOPHUS *sp.*

One specimen only, not in good state, and which I have been as yet unable to determine. (*Mr. Goldie's collection*).

5.—SCOTOPIHILUS NIGROGRISEUS, *Gould*.

One specimen obtained by Broadbent, which does not appear to me to differ from the Australian examples.

6.—TAPHOZOUS, *sp.*

Specimens from Broadbent's collection. Under surface ashy white, back brown, wings and face black, otherwise the same as the Cape York examples, from which it may prove to be specifically different.

7.—HARPYA CEPHALOTES, *Pallas*.

One specimen, obtained by Broadbent, at Heath Island. Is slightly different from the Cape York specimens, and also from those (*H. major*, Dob.) from the Duke of York group.

8.—BELIDEUS ARIEL, *Gould*.

The Port Moresby specimens differ only slightly in the tint of colouring in the fur, being slightly more yellowish than the N. S. Wales examples. This species is closely allied to, if not identical with *Belideus breviceps*, Waterhouse. (*Goldie, Broadbent*).

9.—CUSCUS ORIENTALIS.

This species was not obtained in the immediate neighbourhood of Port Moresby, but some miles inland. Several specimens were collected by Mr. Goldie during his trip to the South East, where they seem to be the common species. I find no material difference between these specimens and those from the Duke of York Islands, collected by the Rev. George Brown, of which the Museum possesses a large series. Morton and Broadbent obtained it on the Laloki River.

10.—CUSCUS CHRYSORRHUS *var. GOLDIEL*

Mr. Goldie has sent a very fine pair of this, perhaps the largest species known—a description of the female of which I have given in the P.E.S. of N.S.W., vol. I., p. 395.

The male resembles that sex of *O. maculata* from Cape York, and is largely marked with irregular white blotches on a dull brown ground. The feet, face, and rump are rusty red or of a yellowish rust colour, in some darker than in others. A waxy secretion near the testes is collected by the natives, and being rolled up with the leaves of a species of *Salvia* is kept as a scent bag, and worn about the person. Broadbent obtained a fine series of this species about 30 miles inland from Port Moresby.

11.—*MACROPUS CRASSIPES*, Ramsay, *P.L.S., N.S.W., vol. I, p. 162*

This is the common species about Port Moresby.

(Goldie, Morton, Broadbent)

12.—*DENDROGALUS, sp.*

A species of *Dendrogalus* was met with upon two occasions, but only one specimen has been obtained, which is, I believe, in Mr. Goldie's collection.

Loc., East Cape, Blunden and Goldie. Goldie River, Broadbent.

13.—*PERAMELES MORESBIENSIS*, Ramsay, *P.L.S., N.S.W., Vol. 2 p. 14.*

One large specimen in Morton's collection measures:—Total length to root of tail, 15 in.; from snout to ear, 3·2 in.; to eye, 1·35; fore foot and toes, 1·6; hind foot and toes, 1·6; tail, 6 in. One young one in spirits obtained by Broadbent is of apparently the same species.

Loc., Port Moresby, Laloki River, Goldie River, &c. *

14.—*ECHIDNA (Tachyglossus) LAWESI*. Ramsay, *P.L.S., N.S.W., Vol. 2 p. 32*

Mr. Goldie was fortunate enough to obtain from the natives three specimens, but unfortunately preserved only the stuffed skins, so that I have no opportunity of adding any further information than that contained in my previous paper. The natives look upon them as a most delicious article of food.

* I may as well indicate here the discovery by Mr. K. Broadbent of a very large species of *Perameles*! in the mountains adjacent to the Goldie River. This animal, which will probably form the type of a new genus, will be described hereafter.

	No. 1.	No. 2.	No. 3.
Total length to root of tail..	16 in	12 in	12·5
„ „ of head	4·3	4 in	4·0
Snout to eye	2·4	2·15	2·3
„ to ear... ..	4·3	4 in	4·3
Length of tail (free portion)	0·9	0·6	0·8
Fore foot, s. u.	1·2	1·2	1·2
Length of mid toe nail	0·9 to 0·95	1·15	1·1
Breadth of do. do.	0·35 to 0·5	0·3	0·3
Hind foot from spur	1·5	1·3	1·1
Length of longest (2nd) toe nail	1·2	1·15	1·2
Length of spur	—	0·35	—
Length of longest quill in tail	2·0	1·8	1·6

PART II.—AVES.

The works referred to in this paper are Count Salvadori's numerous ornithological contributions to the *Annali del Museo Civico di St. Nat. di Genova*, also his *Prodromus Ornithologiæ Papuasie et Moluccarum*, I. to V.; Mr. R. B. Sharpe's *Contributions to the Ornithology of New Guinea*, Papers I, II, and III, in the *Journal of the Linnean Society, Zoology*, vol. XIII; and I have also referred to some former papers of my own on the same subject, published in previous numbers of this Society's Proceedings.

I find, of the 200 species here enumerated, 78 of them are also indigenous to Australia, and, if we add the Australian species from the lists of birds obtained by Signor D'Albertis, and by the Macleay Expedition, we find the number common to the Australian and South East coast of New Guinea, to be 143 species.

ACCIPITRES.

FALCONIDÆ.

1.—HALIAETUS LEUCOGASTER, Gm.

Sharpe, Cat. Acc. I, p. 307; Gould, Bds. Aust. fol. vol. I, pl. 3.

This fine sea-eagle was met with occasionally on the coast. On one occasion Mr. Goldie was fortunate enough to obtain its eggs from an immense nest, composed of about a cartload of sticks and placed on a rocky islet near the coast; a fine adult bird in full plumage was obtained by Broadbent.

2.—*HALIASTUR GIRRENERA*, Vieill.*Sharpe, Cat. Acc. I, p. 315.**H. leucosternus*, Gould, *Bds. Aust., fol. vol. I, pl. IV.*

This fish-hawk was met with only on two or three occasions; the collection contains five specimens, in no way different from those of the New South Wales coast.

3.—*HALIASTUR SPHENURUS*, Vieill.*Sharpe, Cat. Acc. I, p. 316; Gould, Handbk. Bds. Aust. vol. I, p. 20.*

Common at Port Moresby, and all along the coast.

4.—*BAZA REINWARDTII*, Mull. and Schleg.*Sharpe, Journ. Linn. Soc. Zool. XIII, p. 490; id. Cat. B. I, p. 359.**B. stenozoa*; Ramsay, *P. I. Soc. N.S.W., vol. I, p. 387.*

One very fine adult male from Broadbent's collection, shot inland on the Laloki River; it agrees with Mr. Sharpe's description (*Cat. of Bds. I, p. 359*) of *B. reinwardtii*, but is most certainly different from the New Ireland species, which Dr. Sclater places under the same name. *P.Z.S.*, 1877, p. 109.

The Port Moresby bird has five distinct black bars on the basal portion of the tail, and the apical third of the tail black on the central two feathers, diminishing in extent on the remainder, until on the outermost feathers it forms a *sub-terminal* band, the black basal bands are margined on both sides with white on the inner webs of the feathers of the upper surface, which are white at the extreme base. All the bars extend right across the feathers on the upper surface, but none do so on the under surface, except in the centre two feathers; the breast, flanks, upper part of the *thighs*, and *centre of abdomen* are banded; the primaries and most of the secondaries are banded right across on all, except at the base of the secondaries; in our New Ireland birds the primaries are not crossed altogether, and the bands are confined more to the tips of the feathers, the bands on the base of the tail are different in form, and the apical *half* of the tail is black.

5.—*MILVUS AFFINIS*, Gould, *P.Z.S.* 1837., p. 140.

I have only seen two specimens of this hawk from the New

Guinea Coast, they are of a darker race than those usually met with in Australia.

- 6.—*HENICOPERNIS LONGICAUDA*, *Garnot, Voy. Coq. I, p. 588, pl. 10* (1826); *Sharpe, Cat. Birds I, p. 341*.

Milvus striatus, *Diggle, M.S.S. Ill. Aust. Ornith.*

One specimen only from Mr. Broadbent's collection.

Loc., Laloki River.

- 7.—*MACHÆRHAMPHUS ALCINUS*, *Western.*

Sharpe, Cat. Acc. I, p. 342.

A fine pair, male and female, of black hawks belonging to this species were procured on the Laloki River, on October 16, 1877. No information on their habits or nidification was obtained.

There is no sign of a crest of any kind on either specimens, otherwise they resemble *M. alcinus*, (*Western*) in having the abdomen and flanks brown—with the base of the feathers white. There is however a distinct white collar on the back of the neck, the feathers on the central portion of the collar tipped with black. The feathers of the head, neck, shoulders, and interscapular regions are chiefly black; throat white, with a blackish patch on either side, and a stripe of black down the centre; lower portion of the chest white in the centre, the upper portion mottled with black and white; legs and feet bluish grey, bill black, iris yellow, ♂ total length 17·3 inches, wing 13·2, tail 7·3, tarsi 2·1; middle toe 1·7, its nail 0·7, slightly serrated at the base of the inner margin; hind toe 0·8, its nail 1 inch. ♀ total length 17 inches, wing 12·8, tarsus 2·3, bill from forehead 0·8, from gape 1·5, culmen 0·9. The female in this instance, contrary to what I expected, is slightly smaller than the male.

- 8.—*ACCIPITER CIRRHOCEPHALUS*, *Visill, N. Dict. d' Hist. Nat. X., p. 329* (1817); *Sharpe, Cat. B. I. p. 141*.

Only one specimen of this hawk was obtained, some distance inland on the Laloki. The rufous tint on the side of the neck is not continued on the back of the neck; there are other minor differences which can scarcely be specific. The back is of a

clearer blue grey, and the rufous of the under surface deeper in tint than in the Australian specimens; the bill is larger, the under tail-coverts white and the wings and tail shorter.

9.—*ASTUR SHARPEI*, Ramsay, *P.L.S. N.S.W.*, III, p. 173

Astur cruentus; Sharpe, *Jour. Linn. Soc. Zool. XIII*, p. 488.

Several specimens obtained, forming a good series of adults and young, in which the characteristic markings of the immature birds of the genus are well exhibited.

This species takes the place of *Astur approximans* of Australia, and in actions and habits is much the same. It seems to be universally dispersed over the whole of the south-eastern portions of New Guinea.

10.—*ASTUR LEUCOSOMUS*, Sharpe, *Cat. B. I.*, p. 119 (1874).

One specimen only, obtained in Torres Straits—an adult male, in snow white plumage, iris reddish yellow.

PANDIONES.

11.—*PANDION LEUCOCEPHALUS*, Gould, *P.Z.S.* 1837, p. 138;

Sharpe, Cat. of B. I., p. 451.

One specimen only obtained. This species is however common in the Straits and on the South Coast of New Guinea.

STRIGES.

Fam. STRIGIDÆ.

12.—*STRIX DELICATULA*, Gould, *P.Z.S.*, 1836, p. 140.

This species appears to be not rare about Port Moresby. Specimens were contained in every collection made at this place. The young are mostly covered with white or creamy down, but before they are six months old attain a spotted plumage similar to the adults.

13.—*NINOX DIMORPHA*, *Salvad. Ann. Mus. Civ. Genov. VI*, p. 308.

In Mr. Goldie's first collection there was a species of *Ninox*, a fledgling, which I previously described in the *Pr. L. Soc. of N.S.W.*, vol. I., p. 338, and respecting which I regret no further information has been obtained; however, I believe this to be the young of *Ninox dimorpha*, of which we have received a

specimen from Port Moresby. I may here mention that *Ninox odiosa* of Sclater, and my *Ninox novæ-britanniæ* are two *very distinct* species; both birds have been examined and compared by me before *N. odiosa* was sent to Dr. Sclater. See P.L.S. of N. S.W., I., p. 369. How the editors of the *Ibis* could come to the conclusion that both these species, (*N. odiosa* and *N. novæ-britanniæ*) were the same, I cannot imagine. I do not suppose they took the trouble to compare the descriptions.

14.—*NINOX ALBOMACULATA*, *sp. nov.*

This species agrees for the most part with Mr. Sharpe's description of *N. ocellata*, Homb. et Jacq. (*Cat. Bds. II.*, p. 170), particularly in the large white spots on the scapulars and wing coverts. All the upper surface is of an earthy brown tint, head uniform without streaks, upper tail-coverts and outer webs of the tail feathers tinged with fawn color, some of the former with concealed spots of white on the outer webs, tail dark earthy brown with six to eight faint ashy bars, the outer feathers on either side faintly notched on the outer webs with white on the fulvous margin; in other respects like *N. ocellata* as described by Mr. R. B. Sharpe (t.c. p. 170); bill dark horn color; feet brown?

Total length 15.5 in., wing 10.2 in., tail 6.1 in., tarsus 1.5, bill 1.15, culmen 1.35. The only skin is in such a bad state that it is quite impossible to describe it accurately.

From the Laloki River, without sex, but probably a female.

15.—*NINOX UNDULATA*, *sp. nov.*

This species is not unlike *N. rufa* of Gould, but is altogether smaller. It approaches *N. humeralis*, (Homb. et Jacq.) Sharpe's *Cat. of Birds*, II, p. 180; but on the whole differs so much that I think it should form the type of a new species, which I propose to describe under the name of *N. undulata*.

Adult Male. All the upper surface dull, dark chocolate-brown transversely barred with narrow lines of light fulvous brown, becoming almost white on the rump, scapularies, and outer webs of some of the greater wing-coverts which are tinged with rufous; feathers at the base of cere, and the lores, white with black shafts; feathers on forehead whitish at the base, but barred

like those of the head, ear coverts blackish brown; vibrissæ long, black, reaching to the outer margin of the culmen; the coverts of the shoulders and margins of the wings, very dark brown, the bars scarcely visible, the median and greater coverts of a much lighter brown, and the bars almost white on some of the outer webs, primary coverts blackish brown, no bars visible; quills blackish brown with 6 or 7 bars of a lighter tint, the bars paler towards the tips of the secondaries; under coverts fulvous, darkest on the edges and shoulders, all closely barred with dark fulvous brown, tail blackish brown with 8 or 9 brown bands lightest at the base, under surface tinged with ashy, and the bars less defined; all the under surface barred with light rufous brown or fulvous, the interspaces and base of the feathers creamy white, the fulvous bars, bounded on either side with a narrow blackish brown line, usually four bars on each feather. The bars have a more fawn or yellowish fulvous tint, having lost the narrow brown conterminous borders on the abdomen and flanks, where the bases of the feathers are white; legs fulvous sparingly barred with brown; under tail coverts white, fulvous towards the end and there crossed with three or four broken hastate bands of fulvous brown; feet yellow, bristles orange; bill bluish horn colour at the base, white at the tip; eyelid bluish, iris yellow.

Total length 16 to 18 inches, wing 11·5 in., tarsus 1·5, mid. toe (s.u.) 1·7, its claw 1·2; hind toe 1 in., its claw 1 in., tail 8·5.

In the wings the 3rd, 4th, 5th, and 6th quills are nearly equal and longest, the 7th nearly equal to the 3rd. From Mr. Broadbent's collection.

PICARIÆ.

(*Psittaci*).

CACATUIDÆ.

16.—CACATUA TRITON, *Temm.*

I believe I am correct in assigning the small white cockatoo (otherwise like *O. galerita*) to this species.

They were found in large flocks throughout the district. The crest in this species is proportionately larger than in *O. galerita*.

NASITERNINÆ.

17.—*NASITERNA PUSILLA*, Ramsay, *P.L.S., N.S.W. vol. II, p. 105.*

I have considered the birds from Port Moresby distinct from the New Ireland species on account of their smaller size, lighter cheeks and deeper blue on the crown of the head. Mr. Goldie obtained the original specimen on the Laloki River in 1876, and Mr. Morton was fortunate enough to fall in with it near the same place in October, 1877. They traverse the stems and thicker branches of the trees in search of food in small flocks of three to five in number, chattering as they creep along, more like mice than birds, thin, stiff, pointed tail-feathers pressed close against the tree while at rest form a good support. In some of their actions they resemble the *Sittella*, and their long toes seem specially adapted for this mode of progression; iris brown, legs and feet lead color, bill dark horn color. Broadbent met with a troop of about twelve or fourteen in number, creeping over a nest of *Termites*, built on a large branch of a tree in the scrub.

PSITTACIDÆ.

18.—*APROSMICTUS CHLOROPTERUS, sp. nov.*

Adult male. The head and sides of the neck, throat, and all the under surface deep rich crimson, the under tail coverts blackish blue at the base, the tips crimson, tail black above and below, the outer webs above blue, those of the central feathers tinged with green; nape, and hind neck, and a few adjacent feathers on the sides of the chest, lower part of the back, rump, and upper tail-coverts deep rich blue; wings blackish brown, the outer webs of the feathers washed with dark green, the margins of the shoulders, wing coverts, and interscapular region and scapulars, black with a greenish tinge; from the angle or point of the shoulders to the ends of the scapulars extends a broad band of bright verditer green tinged with yellow, the outer margins of the shoulders tinged with blue, under wing coverts blackish blue; base of the bill coral red, the tip and all the under mandible black; feet black; "iris orange-yellow"

"Note like that of the King-Lory," *A. scapulatus, Bechst. (K B.)*

Total length 15 in., wings 7·7 in., tail 9 in., tarsus 0·8, bill from nostril 0·9, culmen 1·1.

Female (or young male?). The rump and upper tail-coverts, blue, as in the male; the primaries and secondaries blackish brown, the outer webs of these feathers, the wing coverts, head, and remainder of the upper surface green; the throat, and sides of the neck green; chest green, with some of the feathers tipped with crimson, breast and remainder of the under surface rich crimson, as in the male, the bases of the under tail coverts black; tail blackish brown above, the outer webs of the three lateral feathers bluish, those of the central ones at the base greenish, under surface black; under wing-coverts green; bill black, an indication of red at the base of the upper mandible; legs and feet black; iris orange yellow. In size the same as the male.

Broadbent obtained this fine species in the mountain district, near the Goldie River, about forty miles inland from Port Moresby.

In describing this species as new, I mention, with regret, that I have not seen a description of *Aprosmictus buruensis*, (*Salvad. Ann. Mus. Civ. Genev. VIII., p. 371*), with all the other known species, however, I have compared it and find it quite distinct.

19.—CYCLOPSITTACUS SUAVISSIMUS, *Sclater., P.L.S. 1876, p. 520. pl. 54 ♂ and ♀ (not quite adult).*

Many specimens of this beautiful little parrot were obtained, in various stages of plumage. They do not appear to be rare and were found feeding chiefly on the fruit of the native figs in scrubs on the Laloki River. The adult males have a patch of white on the side of the neck just below the ear coverts, and the breast is of a deep orange yellow. In the adult female this spot is of a deep orange (like the breast in the male,) and the colouring of the breast is lighter, the white mark at the gape is reduced to a narrow line, which is sometimes continued on to the chin and forms a margin round the blue of the cheeks. Spot on inner margin of the scapularies almost white.

20.—GEOFFROYUS ARUENSIS, *G. R. Gr., P.Z.S. 1858, p. 183.*

This species appears to be not uncommon, nearly every collection that I have seen from the Port Moresby district contained specimens. It would be interesting to get a really good

series of the young and adults of this bird. The young of the New Ireland bird, (*G. cyaniceps*, Puch.) which differs very little from this species, may be distinguished by the inner webs of the tertiaries being white towards the tip, while in *G. aruensis* they are dark brown throughout, the under wing coverts are of a brighter and clearer blue, and the under side of the tail feathers bright green. After the first year the head becomes a deeper rich brown in the young female. In *G. cyaniceps*, Pucher, the young female has a wash of green over the cheeks which is not visible in *G. aruensis*, ♀. The base of the skull is wider by 0.1, and the back of the head much more round in the *G. aruensis* than in *G. cyaniceps*.

21.—*ECLECTUS POLYCHLORUS*, Scop., *Del. Flor. & Faun. Insubr.*, p. 87, n. 27 (1786).

A good deal has been written on the sexes of this and other species of this genus, and their coloration, but I think the matter has, (with respect to the present species at least) by this time been settled beyond doubt. If not, I may mention that Morton, who examined a number of specimens which had just been removed from the nests by the natives, assures me that the young males assume the green dress, and the young females the red dress from the nest during the first year, and that both young red and young green birds were taken out of the same hollow bough in which they were hatched.

This species is very common about Port Moresby. Like the cockatoo (*C. triton*), they are kept by the natives to supply feathers for decorative purposes, the unfortunate birds being kept almost naked, the demand being usually greater than the supply.

TRICHOGLOSSIDÆ.

22.—*EOS FUSCATA*, Blyth, *Journ. As. Soc., Beng.* XXVII, p. 279 (1858).

A good series of this variable species was obtained, including fully adult males and females, and young birds of the year. Iris yellow, skin at base of bill below, bright orange; bill in adult yellow; legs brownish-black.

They were shot in company with other *Trichoglossi*, feeding on the honey of the *Melaleuca* and *Eucalyptus* blossoms.

23.—*LORIUS HYPCNOCHROUS*, G.R. Gr. *List. Psitt. Brit. Mus.*
p. 49 (foot note) 1859.

Lorius hypocnchrous, var. *Gulielmi*, Ramsay, *P.L.S., N.S.W.*
Vol. III, p. 106.

A remarkably fine specimen of this species was shot by Mr. Goldie at Cloudy Bay. This bird, which I believe to be a fully adult male, has the interscapular region black, with the faintest shade of blue; on the neck, the black is separated from that of the head by a narrow line of rich crimson; the abdomen and undertail coverts are almost black. I was at first inclined to consider this a distinct species, but on examining the collection of New Guinea Birds from the voyage of the "Chevert" in the Macleayan Museum, I found there another specimen having the interscapular region black, but not to so great an extent. I think therefore that I am correct in assigning Mr. Goldie's bird to *Lorius hypocnchrous* of Dr. G. R. Gray—of which it is probably a very old male. The figure in the voyage of the "Curaçoa" does not show any black colouring on the abdomen.

24.—*CHALCOPSITTA CHLOROPTERUS*, *Salvad. Ann. Mus. Civ. Genov.*
IX, p. 15 (1876).

Of this species, the young vary somewhat from the adults in being of a duller hue, and having the whole of the head of a dusky green; the under wing coverts are green, with the greater series red margined with black, a large patch of yellow near the base of primaries on under side; bill, and legs dusky brown. In some of the adults I notice a crimson patch on the occiput, and all have the whole of the front of the head and a patch of feathers on the sides of the chest of the same color. On examination of the plate and description of Dr. G. R. Gray's *C. rubrifrons*, I see no reason why *C. chloropterus* should not prove to be the young of that species. I have arrived at this conclusion after a careful examination of a very large series. They frequent the *Melaleuca* and *Eucalyptus* trees when in flower, feeding on the honey-like fluid found in the blossoms.

- 25.—*TRICHOGLOSSUS MASSENÆ*, *Bp., Rev. and Mag. de Zool.*, 1854, p. 157.

This species seems universally dispersed over the whole of the South East end of New Guinea, New Ireland, New Britain, the Duke of York Islands, Solomon Islands, New Hebrides, and New Caledonia, from all of which places I have received specimens, none of which appear to differ, *inter se*. In the Port Moresby district they were found feeding in the various Eucalyptus and other flowering trees and shrubs.

- 26.—*TRICHOGLOSSUS SUBPLACENS*, *Sclater, P.Z.S.* 1876, p. 519.

A female of this species was obtained by Mr. H. Shaw about ten miles inland, near the top of Mount Astrolabe. Mr. Broadbent's collection contains an adult male.

Family CUCULIDÆ.

- 27.—? *LAMPROCOCCYX MINUTILUS*, *Gould.*

This is one of the smaller species allied to *L. minutilus* and *L. russata*, both of which it much resembles, the outer webs of the secondaries above are slightly margined with rufous, all the remainder of the upper surface of a rufous bronzy green, all the tail feathers rich rufous, washed with blackish towards the tip, all but the centre two, with a spot of white on the inner web; the outer on either side barred with black, white, and rufous, the black bands being the broadest and the white the narrowest, the next feather on either side has three bars of black only.

The chin, throat, and all the under surface of the body and the under tail coverts are whitish, strongly barred with bronzy green, the under wing coverts barred like the breast, except the outer series at the base of the primaries; the primaries towards the base light rufous, the secondaries white at the base, pale rufous towards the centre of the inner webs. Bill black; feet ashy grey. Total length, 5.5; wing, 3.8; tail, 2.5; tarsus, 0.5; bill from forehead, 0.65; from gape, 0.75.

The tail is rather square and even, the outer tail feathers being equal in length to the centre ones. The New Guinea specimens do not materially differ from those from the Rockingham Bay

district and Cape York, all agreeing better with *L. minutus*, Gould, than with any other species.

Another individual which I believe is referable to the young of this species is, above, the same in coloration, showing only a little wider rufous margin on the primaries and secondaries, the rufous on the under surface of the inner webs of the wing quills is of a little deeper tint. Throat and chest ashy grey, the rest of the under surface of the body, under tail coverts, and the under wing coverts (except a brownish spot at the base of the primaries) white; the under tail coverts and flanks have a few scattered broad bars of bronzy green, and some of the under wing coverts and axillares show indications of narrow bars of the same tint; the tail is strongly banded as in the adult, but the rufous bars on the outer feathers are very indistinct.

28.—*LAMPROCOCCYX LUCIDUS*, *Gm.*

Only two specimens of this widely distributed species were obtained, they are slightly smaller than those from New Zealand.

29.—*LAMPROCOCCYX MEYERII*, *Salvad.*

Ann. Mus. Civ. Genov. VI, p. 82, (1874).

I believe the bird I have under consideration to be referable to this species; the head has a patch of rich rufous on the forehead, the ear coverts, sides of the head, and all the upper surface of a clear rich bright metallic green, the primaries and secondaries dark-brown at the tips, their central portions to the base on both webs, rich rufous; under wing coverts, chin, throat, and all the under surface, strongly barred with bronzy green and white; under tail-coverts white, barred with bronzy green. Length, 6 in.; wing, 3.5; tail, 2.5; tarsus, 0.6; bill, 0.7.

30.—? *CACOMANTIS ASSIMILIS*, *Gray.*

Specimens which I refer to this species resemble *Cacomantis castaneiventris* of Mr. Gould, but have the throat and head bluish ashy grey, and are smaller. The chest, breast, abdomen, and under tail-coverts of rich castaneous red or rufous, a pale cream or buff-colored oblique band across the under surface of the wings, remainder of the under surface of the wings dark

brown, underwing-coverts rufous, like the breast; all the upper surface of the body dark glossy brown with metallic reflections, the uppertail-coverts of a slightly bluish tint; under surface of the tail ashy brown; all the feathers tipped with white, more extensively on the outer ones, and least on the central two; on the inner webs of the feathers are tooth-shaped markings of white, or of a buffy tinge. Bill black, legs and feet reddish, claws black.

Total length from tip of bill 7·5 in.; bill from forehead, 0·75 in., from gape 0·8 in.; tarsus 0·7 in.; wing 4·15; tail 3·9.

The young is of a dull blackish brown above, each feather margined and barred with rich rufous, the wing quills margined and strongly toothed with the same, the tail somewhat similarly marked, the tooth shaped markings on the margin extend almost across; on the outer two feathers and the uppertail-coverts are barred across with the same rufous tint. The under surface is dark ashy brown, lighter on the flanks, barred with whitish ashy brown and rufous, the under tail-coverts whitish ashy at the base, light rufous towards the tip, strongly barred with blackish brown, bill blackish, legs and feet reddish.

Total length 6·5 in.; wing 4·1 in.; tail 3·9 in.; tarsus 0·7 in.; bill, from forehead, 0·75 in., from gape, 0·8 in.

Hab., Laloki River, &c.

31.—*CACOMANTIS DUMETORUM*, *Gould*.

One specimen obtained, which does not appear different from the Queensland examples of this species.

32.—*EUDYNAMIS CYANOCEPHALA*, *Lath*.

This species appears to be plentiful; it is a migratory species, traversing the countries it inhabits in search of food, remaining to breed in such districts as it may find itself in the proper time of year; it usually selects the deep cup-shaped nest of some of the larger species of Honey-eaters, in which it deposits its egg. A broken egg laid by a bird shot by Mr. G. Masters at Gayndah 25th Nov., 1870, is in length 1·4 in. by 0·9 in. in breadth; the color is white, with dull pale purple brown and light reddish brown spots sprinkled over the larger end, the shell is slightly granular.

33.—*SCYTHTOPS NOVE-HOLLANDIÆ*, Lath.

Salvad. and D'Alb. op. cit. VII., p. 813; Sharpe t. c. p. 492.

Generally distributed over the whole of the South East Coast.

34.—*CENTROPUS SPILOPTERUS*, Gray.

This species is always more or less plentiful about Port Moresby. Mr. Goldie obtained several specimens in various stages of plumage during his first expedition. The fully adult males become almost entirely black.

35.—*CENTROPUS MENBEKII*, Less.

I noticed a fine adult specimen of this species in Mr. Goldie's Collection collected by Mr. Blunden, and another very interesting specimen obtained by Morton exhibits the change of plumage from the young to the adult.

They were found to be rare in the Port Moresby district; the few obtained being shot on the Laloki River, about 15 miles inland.

Family *ALCEDINIDÆ*.36.—*ALCYONE AFFINIS*, Gray, *P.Z.S.*, 1860, p. 348.

I should have referred the larger blue-backed Alcyones, from the Laloki River to *Alcyone pulchra*, were it not for their long and stout bills; the blue patch on the side of the chest is confined to that region, and does not extend on to the flanks; it has, moreover, no lilac tinge whatever.

Total length, 6·4 in.; wing, 3·1 in.; tail, 1·3 in.; tarsus, 0·4 in.; bill from forehead, 2 in. to 2·2 in.; from gape, 2·2 in. to 2·3 in.; depth, 0·4 to 0·44 in.

All the specimens were obtained in the scrubs on the river side. I must admit I do not see the difference between the present sp. and *A. lessoni* (Cass).

37.—*ALCYONE PUSILLA*, Temm., *Pl. Col.* 595, f. 3. (1836).

I believe this species to be the smallest of all known Kingfishers, and although they may be far from rare in any district frequented by them, they are always very difficult to obtain; their flight is swift and arrow-like, dashing past like a flash, just over the surface of the water, in the most dense and secluded

parts of the creeks which wind through the scrubs; they utter a shrill, clear, piping cry, settle abruptly on a bough, and frequently turning round, almost immediately present their dark blue back instead of their white breast, so that if once lost sight of, they are difficult to detect. They were plentiful on the Laloki River during Morton's stay there, and are found also in Queensland as far south as the Herbert River.

38.—*CEYX SOLITARIA*, Temm. Pl. Col. 595. f. 2. (1836).

I have seen but two examples of this elegant species from the Laloki River, where it is evidently rare. Both were obtained in the most dense part of the scrubs near the river, at a distance of about 15 miles from Port Moresby.

39.—*TANYSIPTERA GALATEA*, Gray.

Tanysiptera microrhynchus, Sharpe, Journ. Linn. Soc. Zool., 1877, p. 313.; *T. galatea* var. *minor*, Salvadori, &c.

This fine kingfisher is evidently very plentiful in the scrubs fringing the Laloki; both Morton's and Mr. Goldie's collections contained many fine examples. The centre two tail feathers in some of the specimens, attaining the length of 13 inches. I can find no difference between the Port Moresby specimens and some collected by Dr. Beccari, at "Warbresi" in the North West; except in the greater length of the tail feathers and shortness of the bill. Like *Tanysiptera sylvia*, this species appears to be solitary in its habits except when breeding; they frequent the thickest parts of the scrubs, and seldom go near the water. Morton notes that on one occasion he saw one fly down to the waters edge as if to drink, but scarcely remaining half a minute, dashed off again into the scrub. They breed in November and December, laying 5 round white eggs in a hole dug in a bank, or in the nest of the white ants, Termites.

40.—*TANYSIPTERA SALVADORIANA*, sp. nov.

This species has been looked upon as *T. sylvia* (Gould), but upon close examination will be found to be quite distinct. Dr. Salvadori has pointed out the chief differences, from specimens obtained by D'Alberty.

I have examined several specimens obtained by Broadbent, and find all these distinctions constant. This species which otherwise resembles *T. sylvia*, may at once be distinguished from it by the much lighter colouring of the under surface, and the very different tint of blue of the wings, head, and tail, which has a greenish tinge; it is moreover, altogether a smaller bird. The centre tail feathers, when fully grown are very much longer, attaining the length of 10·3 inches, the webs are also broader and do not taper so much as in *T. sylvia*.

Total length from bill to oil gland, 4·2; two centre tail feathers from oil gland, from 8 in. to 10·3 in.; wing, 3·5 to 3·6 in.; tarsus, 0·55; bill from forehead, 1·25, width at nostril, 0·35, height, 0·37.

Morton reports having once met with this species some 50 miles inland from Port Moresby, its note differs from that of *T. sylvia*. The specimens are from Broadbent's collection.

41.—*SYMA TOROTORO*, Less. *Voy. Coq. Atlas pl.* 31 bis, f. 1 (1826).

The saw-billed kingfisher of New Guinea has been usually identified with the yellow-billed kingfisher from Cape York, (*S. flavirostris*), and indeed I am by no means certain that this view of the case is not the correct one. Mr. R. B. Sharpe in his very excellent monograph, on the Alcedinidæ, has endeavoured to show that they are distinct, but I do not consider that the slight differences, which certainly do exist between the New Guinea and Australian birds, are sufficient to separate them into distinct species. I have lately examined a large series of both the Australian and New Guinea birds, the latter from the South East Coast. I find in the males of the New Guinea specimens, the under surface of the tail feathers, blackish brown, and the half collar round the back of the neck is divided in the middle, by a patch of *white* in some; in the females, the *crown* of the head only is black, as pointed out by Mr. Sharpe, and all have a mixture of white in the middle of the collar.

In habits and actions, *Syma torotoro* resemble the land and not the water loving sections of the *Alcedinidæ*. They are found in the most dense parts of the scrub, and live on insects and

their larvæ; none were obtained within 12 miles of the coast. I have heard of one instance in which the Australian bird has been found in a belt of Mangroves at Cape York.

- 42.—*HALCYON MACLEAYI*, *Jard and Selb., Ill. Orn. pl.* 101.
♂ (1825-1839).

Many specimens of this species were obtained, showing that it is one of the most common species in the neighbourhood of Laloki River. They do not frequent the scrubs, but are generally found in the opens and forest country. In habits they are much the same as *Halcyon sanctus*, breed in holes in hollow boughs, or in tunnels dug in the nests of the Termites, at the end of which they lay 5 pearl-white, glossy, round eggs. This species has an extensive range, and is found as far south in New South Wales as the Clarence River, and as far to the north-west as Port Darwin, where it is common (*Spalding*).

- 43.—*HALCYON ALBICILLA*, *Cuv., Dumont, Dict. Sc. Nat. XXIX*,
p. 273 (1823).

Several specimens of this fine species from Coutance Island.

- 44.—*HALCYON SANCTUS*, *Fig. and Horsf. Trans. Linn. Soc. XV*.
p. 206, (1826).

Common everywhere, both on the coast and inland.

- 45.—*DACELO GAUDICHAUDI*, *Quoy et Gaim. Voy. Uran. Zool. p.* 112,
pl. 25, (1824).

Equally common with the foregoing.

The collections contained several specimens of both sexes. In habits they resemble the species of Australia, particularly in the upward jerking of their tail after calling. Their note is a hoarse squeaking monosyllable.

- 46.—*DACELO LEACHII*, *var.*

Dacelo intermedius, *Salvad. Ann. Mus. Civ. Gen. IX. p.* 21,
sp. 99 (1876).

I scarcely think that the slight differences visible between the New Guinea birds and *Dacelo leachii* of Cape York, merit their being separated into distinct species. The blue-backed *Dacelo* is

common in the immediate neighbourhood of Port Moresby, as well as inland, and inhabits the open forest country; breeds in hollow boughs, laying 5 eggs, white, 1·65 in. length by 1·33 in breadth.

47.—*MELIDORA MACRORHYNCHA*, Less.

Melidora goldiei, Ramsay. *P.L.S. of N.S.W. I.* p. 389,
(Dec. 27th 1876).

Melidora collaris, Sharpe. *Journ. Linn. Soc. Zool.* March 1877,
p. 313 (♀).

Since describing the male of this fine species, I have had an opportunity of examining several other specimens all from the same locality. A female procured by Mr. William Blunden, one of Mr. Goldie's collectors, exhibits slightly different markings to the type of the species described in the Proceedings of the Linnean Society of New South Wales. I do not consider this female quite adult, but it may be thus described. All the upper and under surface similar to the male, having the crown of the head black, each feather tipped with bluish or greenish-ochre; the spots on the back, and wings of a greenish-ochre of a brighter and more greenish tinge than in the male; there are a few ochraceous buff on the ear coverts and sides of the neck and throat; the blue tipped feathers of the back of the head and nape are longer than in the type or than in any of the males. The bill is also broader in some specimens than in others.

Female. Total length, 10·3; wing, 4·7; tail, 3·6; tarsus, 0·7; bill from forehead, 1·9, from gape, 2·3, length of hook, 0·23, width opposite nostril, 0·9, width across gape, 1·1 inches

This *Melidora* is only found in the dense scrubs, inhabiting such situations as are chosen by *Tanyseiptera galatea*. It procures most of its food on the ground, digging with its bill among the fallen leaves and debris. No information was obtained on its habits or nidification.

I feel convinced that both Mr. R. B. Sharpe and myself have fallen into error in describing this bird as *new*; it will undoubtedly prove to be the *adult* male of *Melidora macrorhyncha*,

as the females agree very well with Lesson's figure in the *Voyage de la Coquille*.*

MEROPIDÆ.

48.—*MEROPS ORNATUS*, *Lath., Ind. Orn. Suppl. p. 35. (1801).*

Universally dispersed over the whole Eastern portion of Australia and South East end of New Guinea. Many specimens were obtained.

Family BUCEROTIDÆ.

49.—*RHYTHIDOCEROS FLICATUS*, *Penn.*

Buceros ruficollis, *Vieil. Nouv. Dict. D'Hist. IV. p. 600. (1816); Ramsay, P.L.S. of N.S.W., vol. I, p. 393.*

This fine horn-bill which is far from being rare in the vicinity of Port Moresby, has caused no slight excitement to inexperienced collectors and recent travellers.

The loud rustling of its wings on taking flight, and the immense masses of undigested portions of food, &c., thrown up by this bird, has given rise to wide conjectures as to its size and the great expanse of its wings; some affirming that they reached to at least 20 feet. Signor D'Albertis has reduced Mr. Stone's gigantic bird to its proper proportions, but I think he has failed to solve the mystery respecting the large heaps of excrement, supposed to belong to some large animal. These heaps are nothing more than the undigested food turned out of the paunches of the kangaroos when slain by the natives according to their custom after killing an animal. The eggs of this species I have previously described. (*P.L.S. N.S.W., vol. I, p. 393*).

Family CORACIIDÆ.

50.—*EUEYSTOMUS CRASSIROSTRIS*, *Sclater; P.L.S. 1869, p. 121.*

Tolerably plentiful and universally dispersed over the district around Port Moresby; in habits and actions, much the same as *E. pacificus*. Numbers arrived during the months of December

* Since the above was written, I have been favoured with a copy of Count Salvadori's paper on Papuan Birds, in which I find the same opinion expressed. (See *Ann. del Mus. Civ. di Genov. XII, 1878*).

and January, accompanied by their young, which are more uniform in coloration and much duller in plumage; they have the bill black, and no light spot on the wing.

Family PODARGIDÆ.

- 51.—PODARGUS PAPUENSIS, *Quoy et Gaim., Voy. Astrol. I, p. 207, pl. 18. (1830).*

I am not at all certain that I am not including two species under this name, some agree with the figures of *P. papuensis*, in Gould's Birds of Australia; others are nearly devoid of the white blotches on the wing, are of a dull colour and minutely vermiculated with ashy gray; others again are heavily blotched and marked with white above and below, and have a white superciliary stripe well defined. I find individuals so variable that for the present I prefer leaving them all under the above name, than making a new species. I found considerable variation also, in the specimens I obtained while at Cardwell in 1873-4, scarcely two being alike. The young birds do not show the spots or markings plainly, being often without blotches.

- 52.—PODARGUS MARMORATUS, *Gould.*

I am by no means sure that this species is correctly determined. It has *two* well defined rows of white spots on the wing coverts, and a subterminal spot of black on all the feathers of the upper and under surface. One specimen only obtained far inland on the Goldie River.

- 53.—AGOTHELES BENNETTII, *Salvad and D'Alb., Ann. Mus. Civic. Genov., vol. VII, p. 816.*

One specimen only from Broadbent's collection, obtained on the Goldie River.

Family CAPRIMULGIDÆ.

- 54.—CAPRIMULGUS MACROURUS, *Horsf.; Salvad. and D'Alb., Sharpe, op. cit. XIII, p. 493.*

One specimen obtained by Mr. Goldie; a young bird without the white blotches on the wing-quills, and two adults from Mr. K. Broadbent. All from the Laloki River.

CYPSELIDÆ.

- 55.—MACROPTERYX MYSTACEA, *Less., Voy. Coq. Zool. Atlas, pl. 22*
(1826).

This fine tree swallow was not found plentiful, although it is very generally dispersed over the whole of New Guinea, New Ireland, and the adjacent islands, and as far east as the Solomon Islands, and New Georgia.

Two specimens were obtained by Mr. J. H. Shaw near Port Moresby, and another by Broadbent during a trip to South Cape.

- 56.—COLLOCALIA SPODIOPTGIA, *Peale.*

A species of Collocalia was met with by Morton on one occasion; it is probably the same as one of the species met with and obtained by Broadbent during Mr. Stone's Expedition. The specimen shot by Morton had built its nest on the under side of a large dead tree, which had fallen across a creek running into the Laloki River. Specimens obtained by Broadbent are identical with *Collocalia spodiopygia*. I regret to say Morton's specimen, having fallen into the water, was lost.

PASSERES.

Order PARADISEIDÆ.

- 57.—MANUCODIA ATRA, *Less. Voy. Coq. Zool. I. pl. 2. p. 638.*

This species was found very plentiful in the immediate neighbourhood of Port Moresby, and many were obtained in the scrubs on the Laloki River, distance only 12 miles inland. Their note has not that peculiar trumpet-like cry so remarkable in *Manucodia keraudreneri* and *M. Gouldii*. They were found usually in small troops.

- 58.—MANUCODIA KERANDRENERI, *Less and Garn. Voy. Coq. pl.*

Like the proceeding, this bird was found by no means rare, but always at a distance from the coast; all the specimens obtained were shot in the scrubs on the banks of the Laloki River, at least 12 miles inland. Their cry is remarkable and peculiar, and by those who have heard it, said to resemble the

squeak of a toy trumpet. This species was usually met with in pairs, frequenting the fruit-bearing trees in the dense scrubs. The trachea is external, and similar to that organ in the Australian *M. Gouldii*, Gray.

- 59.—*PTILORHIS MAGNIFICA*, Vieill., *N. Dict. d' Hist. Nat.* XXVIII, p. 167. pl. G. 39. fig. 3 (1819).

One female obtained during a trip to the South-East, probably at Cloudy Bay, and two adult males and two young males sent by Broadbent, obtained about 30 miles inland from Port Moresby.

- 60.—*PARADISEA RAGGIANA*, Sclat., *P.L.S.* 1873, p. 559.

This, certainly one of the most beautiful of its tribe, is the only species of the genus found near Port Moresby; its nearest locality is about 12 miles inland on the banks of the Laloki River. They usually frequent the higher branches of the larger trees, but sometimes also those of smaller growth, in search of berries, their chief food, associating in troops of from 5 to 10 in number, the young birds and females predominating. The adult males, easily found by their loud cry of "Wook," "Wook," repeated some 10 or 12 times in succession, are rendered more conspicuous by their habit of elevating and spreading their plumes immediately after "calling," shaking them out as it were, with a continuous tremulous motion for two or three minutes. It was only after their feeding time in the morning that they were observed thus besporting themselves.

Mr. Goldie obtained a very fine series in all the various stages of plumage, and in addition to those shot by Mr. Morton, I have examined others procured by D'Albertis, Dr. James, and Broadbent. From these various collections, I find that the young males resemble the females for at least the two first years, so closely, that the sexes cannot be determined without discretion. The first change is the darkening of the throat, then the change from the dark chocolate to bright green, the frontal band or bar becomes darker, and finally deep dark green, and the velvety yellow feathers of the head take the place of the dull olive yellow of the young birds. After these changes, the two wire-like centre tail feathers

appear, and attain their full length before the long flowing plumes on the side and yellow bar on the shoulder, are full grown.

I find apparently full-grown males, but *without plumes*, still having the centre two wire-like tail feathers of great length; this seems to argue in favour of the side plumes being shed every year, but I am inclined to the other view of the case as stated above. The *Raggiana* from the south-east end of the island, are slightly larger in their dimensions, than those obtained about Port Moresby on the Laloki River. The plumes also are longer, thicker, and richer—this may be on account of the age of the individuals.

The natives of Hall Sound, and in fact all along the coast, do a considerable trade in Paradise plumes, taking the birds with nets at night while roosting. Morton failed to obtain any information respecting their nidification, although from the numbers of young birds and females which are to be found all the year round near Port Moresby, they must breed somewhere in the neighbourhood.

At Orangerie Bay and Amazon Bay, large numbers of plumes were obtained from the natives; over 70 were obtained in two days.

61.—*CICINNURUS REGIUS*, *Linn. Syst. Nat. I, p. 166, n. 2* (1766).

Several fine adult males were obtained by Morton, Blunden, and Broadbent, frequenting the most dense portions of the scrubs on the Laloki River. Like others of its tribe, the king bird indulges in showing off something similar to the preceding; its cry is not so loud, but otherwise resembles that of *P. raggiana*. At intervals, immediately after calling, the green-tipped side plumes are raised at right angles with the body, or brought forward and vibrated while expanded, the wings slightly raised. The adult males appear to be solitary; on no occasion were two or more found together; like the other species they feed on berries, and seem to be of somewhat of a pugnacious disposition. On the whole, they are difficult to obtain until you become acquainted with their note.

In the living bird the bill is bright light yellow, and the legs and feet deep blue; the latter fade very quickly, and the color is quite gone two days after death. (*A. M.*)

Sub-family SCENOPINÆ.

- 62.—*CHLAMYDODERA CERVIVENTRIS*, Gould, *P.Z.S.* 1850, p. 201.

This appears to be one of the most common birds about Port Moresby, but is confined to the coast, not being met with inland. The bowers were also found, and a fine specimen presented to the Museum by Mr. Goldie, obtained during his first expedition, shows them to be made of fine twigs placed in an upright or slightly slanting position, and gently arched over in the middle; the inside and sides of the bower, and sometimes the tops of the twigs, are ornamented with berries.

The fawn-breasted bower bird is usually found in small troops of six to ten in number, and feeds on fruits and berries.

- 63.—*AILURÆDUS STONEI*, Sharpe, *Nature*, Aug. 17th, 1876, p. 839.

Of this fine species only a few specimens were obtained; they were found in the dense scrubs, feeding on fruit and berries, about 15 miles inland.

MUSCICAPIDÆ.

- 64.—*PELTOPS BLAINVILLEI*, Garn., *Voy. Coq.* pl. 19, fig. 2.

Several males and females were obtained in the scrubs on the Laloki River; their actions resemble those of *Monarcha* more than any other flycatcher. I regret to say Morton's notes contain little information on their habits, and nothing respecting the nidification of this species seems to be known.

- 65.—*PIEZORHYNCHUS ALECTO*, Temm., *Pl. Col.* 430. fig. 1. (♂.)

M. chalybeocephalus, Garn.; *P. nitidus*, Gould.

The specimens obtained, males and females, do not in any way differ from those from New Ireland and Duke of York Islands, or from the Queensland examples of *Piezorhynchus nitidus*, of Gould, Bds. of Australia, fol. Vol. II. pl. 88.

- 66.—*MONARCHA CARINATA*, Vig. and Horsf.

Several individuals from the Laloki River. They do not differ from the N. S. Wales specimens; the sexes are alike in plumage, but the males having slightly more black on the chin,

67.—*MONARCHA GUTTULATUS*, *Garn., Voy. Coq. pl. 16, fig. 2.*

Several adults and young from the scrubs on the Laloki. The young have the head uniform in color with the back, the ear coverts and throat dull blackish brown, the wings brown, and a wash of rusty yellow on the chest and sides.

68.—*MONARCHA ARUENSIS*, *Salvad., Ann. Mus. Civic. Genov. vol. VI, p. 309; Sharpe, Journ. Linn. Soc. Zool. XII, p. 497.*

M. melanotus, *Sclater, P.Z.S. 1877, p. 100.*

I have examined a large series (over twenty specimens), adults male and female, and young, of these birds from Duke of York Islands, Port Moresby, and the Aru Islands, and regret to find so little difference between them. The bills of the Port Moresby birds are decidedly smaller; the black of the back extends to the rump, but not on to the upper tail coverts, and the yellow is of a lighter tint than in those from New Ireland and the Duke of York Islands; and in this respect, as pointed out by Mr. R. B. Sharpe (*l.c.*), are identical with those from the Aru Islands. The following measurements, taken from specimens lately acquired for Australian Museum collection, will illustrate the relative sizes of individuals from the different localities:—

<i>MONARCHA ARUENSIS</i> , <i>Salav.</i>				<i>MONARCHA CHRYSOMELAS</i> , <i>Garn.</i>			
Port Moresby.				New Ireland & Duke of York Ids.			
Total length	♂, 5.1 in.	5.2;	♀* 5 in	♂, 5.5 in.	♀ 5.6;	juv. 5.5	
Wing	" 2.8 "	2.75;	" 2.64	" 2.8 "	" 2.6;	" 2.7	
Tail	" 2.6 "	2.4;	" 2.3	" 2.5 "	" 2.45;	" 2.5	
Tarsus	" 0.7 "	0.65;	" 0.6	" 0.7 "	" 0.7;	" 0.7	
Bill from frhd.	0.65 "	0.65;	" 0.6	" 0.7 "	" 0.7;	" 6.5	

* Not quite adult; back, wings, and tail olive brown.

An adult male from the Aru Islands measures 5.2; wing, 2.7; tail, 2.45; tarsus, 0.7.

69.—*MONARCHA MELANOPTERA*, *G. R. Gray. P.Z.S. 1858, p. 178.*

One specimen, agreeing well enough with Dr. Gray's description, except in the size.

♀ Total length, 5.2 in; wings, 2.9 in; tail, 3 in; tarsus, 0.75 in; bill from forehead, 0.65 in; from gape, 0.7.

Loc., Goldie River, from Mr. Broadbent's collection.

70.—*ARSES ENADO*, *Less. and Garn., Voy. Coq. pl. 15, fig. 2 (♀)*
Artes telescopthalmus, *Less. and Garn., Voy. Coq. pl. 18, fig. 1 (♂)*

This species was found tolerably plentiful on the Laloki River. Its range extends over the greater portion of New Guinea, New Ireland, and the Duke of York Islands.

71.—*RHIPIDURA SETOSA*, *Quoy and Gaim.*

Voy. de l'Astrol. I, p. 181, t. 4, f. 4 (1830); *R. gularis*, *Mull.*

I see no difference between the Port Moresby specimens and those from New Ireland and Duke of York Islands, which differ but very little from *R. isura*, of Gould, from Queensland.

72.—*RHIPIDURA CASTANEOCHORAX*, *sp. nov.*

Adult male. Head, and all the upper surface of the body, dark bluish slate color, tail blackish brown, below almost black, above lighter, the outer three feathers largely and the fourth on either side slightly tipped with white; wings blackish brown above, lighter below, the margins of the inner webs on the inner side tinged with light brown; the margins of the shoulders, the outer row of the smaller wing coverts, and the coverts of the secondaries like the back, and tipped with a white spot, tinged subterminally with pale rufous; a white line extends from above the lores over the eye in a broken line to above the ear-coverts; chin, and a line on either side of the throat to below the ear-coverts, white; a narrow band between the chin and chest black; chest, breast, underwing-coverts, and remainder of the under surface rich cinnamon rufous, paler on the abdomen; under tail coverts white, tinged at the base with light cinnamon. Bill dark horn color, legs reddish brown, bristles black, extending to beyond the bill.

Total length, 5·3 in.; wing, 3 in.; tail, 3·2; tarsus, 0·6; bill from forehead, 0·5.

This pretty species, which comes near to *R. hyperythra* (Gray), and *R. rufiventris* of Muller, was obtained by Mr. Kendal Broadbent on the Goldie River, about 40 miles inland.

73.—*RHIPIDURA AMBUSTA*, *sp. nov.*

Head brown, becoming reddish brown on the hind neck, interscapular region and wing coverts; becoming deeper, and darker in tint on the back, rump, and upper tail coverts, where it

is almost rufous; wings rich brown, the outer webs of the quills above with a rufous shade; tail above and below, and the under tail-coverts, black; the basal portion of the feathers on the forehead and a line over the eyes, lower portion of the ear-coverts, and the throat white; chest blackish, becoming brown on the breast, each feather with a white shaft, and a triangular spot of white at its tip, the remainder of the under surface brown; under wing coverts mottled brown and white. Bill and bristles black, lower mandible white, its tip brown, legs black.

Total length, 6·4 in.; wing 2·3; tail, 3·6; tarsus 1·2; bill from forehead, 0·7 in, from gape 0·8 in.

The wings of this species are very broad and comparatively short, the 4th, 5th, 6th, and 7th quills nearly equal and longest, the 8th equal to the 3rd. All the body feathers are more or less decomposed.

74.—*SAULOPEOCTA TRICOLOR*, Vieill.; *Salvad et D'Alb. Ann. Mus. Civ. Gen. VII.*, p. 23.

Muscicapa melaleuca, Quoy et Gaim, *Voy. de l'Astrol. I.* p. 180. t. 4, f. 3.

On comparing the Port Moresby specimens with some from New Ireland I can find no difference between them, they are undoubtedly identical with *Muscicapa melaleuca* of Quoy and Gaimard.

In some of the adult males I find white dots on the throat and chin feathers, they differ but little, if anything, except in size, from the New South Wales *S. motacilloides*.

75.—*MICRÆCA FLAVIGASTER*, Gould, *Bds. Aust.*, fol. vol. II., pl. 94.

Common in the neighbourhood of Port Moresby and on the Laloki River. From Morton's notes I gather that this species has considerable power of song, being heard at daylight in the morning pouring forth its melodious warbling notes. When I met with this same species on the Herbert River, in Queensland, during the months of March and April, its singing had ceased, this was just after the moulting season. Its nest and eggs are scarcely to be distinguished from *M. fascians* of New South Wales.

The Port Moresby birds have the crown of the head darker, and a more olive brown tinge on the upper surface, than is seen in the Queensland specimen of this species.

76.—? *MICRÆCA FLAVOVIRESCENS*, G. B. Gray, *Salvad and D'Alb.*

Ann. Mus. Civic, Genov. VII., p. 21.

Adult male. All the upper surface and the sides of the neck dull olive green, wings and tail dark brown, the outer webs of the feathers margined with the same tint as the back, the inner webs of the under surface inclining to white, under wing-coverts yellow, a very narrow line of yellow feathers on the eyelid, sides of the head and ear-coverts tinged with olive yellow, all the under surface olive yellow, becoming clearer yellow on the throat, chest, abdomen, and under tail-coverts.

Bill black above, lower mandible yellow, legs and feet yellow.

Total length 4·8 in., wing 3·1 in., tail 2·5 in., tarsi 0·55—0·56, bill from forehead 0·65, from gape 0·75, from nostril to tip 0·45; breadth at nostril 0·2; at gape 0·35.

This species is very close to *Micræca flavovirescens* but may hereafter prove distinct; the lores are not white, although the basal portion of the feathers incline to that color there is no yellow ring round the eye, and the total length is smaller by half an inch.

Broadbent states that he shot this bird in the scrubs, and that it had the habits and actions of an *Eopsaltria*.

Loc. Mountain scrubs, Goldie River.

77.—*EOPSALTRIA PLACENS*, *sp. nov.*

Adult male. All the head, nape, ear coverts, and chin dark slaty brown; the back of the neck, back, upper wing coverts, and all the upper surface greenish olive; wings and tail very dark brown, the outer margin of the wing quills and of the tail feathers washed with the same greenish olive tint above, lighter below; a dark olive spot at the base of the primaries, preceded by a spot of white; the inner margins of the quills whitish towards the base; the margins of the wings below and the under wing coverts bright yellow; the lower part of the throat and upper portion of

the chest, and extending on the sides of the neck to the ear coverts, the lower portion of the breast, and the abdomen, flanks, and under tail coverts bright rich yellow; a band across the breast greenish-olive like the back, the olive extending slightly towards the flanks over the axillaries; bill black; "iris brown; legs and feet bright orange." (*K.B.*)

Total length, 5 in to 5·2; wing, 3·55; tail, 2·25; tarsus, 0·85; hind toe, 0·5; bill from forehead, 0·77; from gape, 0·85; from nostril to the tip, 0·45; bristle black, extending to nearly the tip of the bill; bill robust.

The female is the same in plumage, but slightly smaller, 4·8; wing, 3·85; tail, 2·15; tarsus, 0·75; hind toe, 0·4 in.; bill from forehead, 0·72 in.; from gape, 0·8; from nostril to tip, 0·4 in.

Loc., Mountain scrubs, near Goldie's River.

This is a fine robust species, with a strong bill, and wings reaching to the end of the tail. It exhibits much of the form and general appearance of the genus *Leucophantes* of Dr. Sclater.

Family MUSCICAPIDÆ. (?)

78.—*GERYGONE INCONSPICUA*, *Ramsay, P.L.S., N.S.W., vol. III, p. 116.*

This species comes near *G. chloronotus* of Mr. Gould, but differs in having a pure white throat; and the chest, breast, abdomen, and under tail-coverts citron yellow; from *G. albogularis*, it may be distinguished by having the tail of a uniform tint, without any bar or white tip; a spot in front of the lores, and a ring round the eye, white; an oblique blackish spot, from in front to under the eye, across the gape; flanks tinged with olive; under wing coverts white, washed with citron colour; tail and wings brown above, the outer webs washed olive; the quills lighter brown below, shafts of the tail feathers white at the base below, brown above; all the upper surface of the body olive brown, tinged with green; bill black; legs and feet lead colour.

Total length from tip of bill, 3·7; wing, 2·1; tail, 1·7; tarsus, 0·7; bill from forehead, 0·5. Sex ♂ ?

Hab., scrubs on banks of Laloki River, where Morton informs me he obtained it among the leafy tops of the trees.

- 79.—*GERYGONE CINERASCENS*, Sharpe, *Journ. Linn. Soc. Zool.*
XIII, pp. 494, 495.

Two specimens, closely allied to *G. albogularis*, Gould. A young bird, which I believe to belong to this species, has a tinge of olive brown on the upper surface, rump and upper tail coverts light brown, throat light yellow. Morton and Blunden obtained this species on the Laloki River during the months of July and August.

MALURIDÆ.

- 80.—*MALURUS ALBOSCAPULATUS*, Meyer, *Sitzber. der. k. Ak. der Wissensch. zu. Wien. LXIX*, p. 496 (1874).

This well-marked species is universally dispersed over the whole of the south-east coast. It is plentiful on the grassy slopes about Port Moresby during the months of April, May, and June, and are usually met with in small troops of five or six in number. In habits and actions they closely resemble the Australian species of the genus. On examining a large series I find those marked as females differ from the males in having the wing quills brown instead of black; but I think this is rather a sign of immaturity than a sexual difference, as the young are chiefly of a dull brown colour.

- 81.—? *TODOPSIS CYANOCEPHALA*, Quoy. et Gaim. *Voy. Astrol. t. 5, f. 4.*

Todopsis bonapartei, G. R. Gray, *P.Z.S.* 1858, p. 177 (*female*).

- T. cyanocephala* (Q. et G.); Ramsay *P.L.S.N.S.W. III.* p. 108.

This beautiful species is found all along the south-east coast. It is not common in the Port Moresby district; the few obtained were all shot on the Laloki River, and were found frequenting the thickest parts of the scrubs, always in pairs, hopping over the ground, and searching among the fallen leaves and low vines for insects, carrying the tail erect after the manner of the *Maluri*, from which they differ in habits chiefly in confining themselves to the scrubby parts of the country, being seldom if ever seen in the opens. After a careful examination of the plates and descriptions of *T. cyanocephalus* of Quoy and Gaimard, and *T. bona partei* of G. R. Gray I feel convinced that the latter is merely the female of the

former. The tint and intensity of colouring varies a little in the males, but both the male and female from Aru Islands agree exactly with the Port Moresby specimens.

82.—*CISTICOLA RUFICEPS*, Gould.

Gould, *Bds., Aust., fol. vol. III, pl. 45.*

Specimens of this *Cisticola* were obtained at Port Moresby, where they were tolerably plentiful on the grassy slopes during the months from March to June. I can find no material difference between them and those from New South Wales. The young and females have blackish stræ on the head, and the tails longer than in the adult males.

83.—*CISTICOLA LINEOCAPILLA*, Gould.

Gould, *P.Z.S., pt. XV, p. 1; Bds. Aust., fol., vol. III, pl. 43.*

A specimen, which I refer to this species, was obtained, I believe, during a trip to South Cape, probably at Bramble Haven.

Family *HIRUNDINIDÆ*.

84.—*HYDROCHELIDON NIGRICANS*. Less.

Hirundo nigricans, Less. *Compl. Buff., t. VIII, p. 497.*

This swallow was obtained about 15 miles inland; they were not found plentiful; one specimen only in Mr. Goldie's collection obtained by Mr. Wm. Blunden.

85.—*HIRUNDO JAVANICA*, Sparrm. *Salvad. t. c. p. 23; Ramsay, op. cit. I, p. 388.*

One specimen obtained. It seems distributed over the whole of the south-eastern portion of New Guinea and Torres Straits.

DICRURIDÆ.

86.—*DICRURUS CARBONARIUS*, Bp.

Chibia carbonaria, Mull.; *Sharpe Journ. Linn. Soc., Zool. XIII, p. 499.*

Common everywhere in the Port Moresby district, and all along the south coast.

One specimen, which does not differ materially in other respects, has a very short thick bill, swollen laterally, curved and ridged; this may be an individual peculiarity, as I have not found others at all resembling it in this respect.

The bill from forehead, 1·3; from nostril to tip, 0·8; culmen, 1·5; width at nostril, 0·5; height, 0·5; width at base, 0·7; height at base, 0·55.

ARTAMIDÆ.

- 87.—*ARTAMUS LEUCOPYGIALIS*, Gould; Ramsay, *P.L.S., N.S.W., vol. I, p. 392*; Sharpe, *l.c. p. 501*; Ramsay, *List. of Aust. Bds., sp. 75*.

This species seems to be very generally distributed over Torres Straits and the south coast of New Guinea. I have seen specimens in every collection that I have examined from those parts. The birds were common about Port Moresby itself, and also for twenty miles inland, and at Cloudy Bay. It has also been found over the whole of the southern, eastern, and northern portions of Australia.

DICÆIDÆ.

- 88.—*DICÆUM RUBROCORONATUM*, Sharpe; *Nature*, 17th Aug., 1876, p. 339, *id. Journ. Linn. Soc. Zool., XIII, p. 496*.

This beautiful little species was first obtained during Mr. Macleay's expedition to New Guinea. Messrs. Broadbent and Petterd also obtained fine specimens during Mr. Stone's expedition, from which Mr. R. B. Sharpe took his descriptions.

Morton found them frequenting the topmost branches of some low trees in the watercourses on the hill sides near Port Moresby, feeding on berries.

- 89.—*MELANOCHARIS*, *sp.*

Probably *M. unicolor* of *Salvadori*; *Ann. Mus. Civ. St. Nat. Genov. XII, p. 333*.

The whole of the plumage black, with a greenish metallic gloss; except on the quills; underwing coverts and axillaries snow white; lateral feathers of the under tail coverts blotched at the base with white, and an indication of a spot of white at the tip of the inner web of the outer tail feathers.

Should this species prove to be distinct from *M. unicolor*, I propose for it the name of *M. bicolor*.

Total length, 4·2 in. ; wing, 2·55 in. ; tail, 2 in. ; tarsus, 0·7 in. ; bill from forehead, 0·55 in. ; from gape, 0·6 in. ; from nostril to tip, 0·3 in.

One specimen only obtained by Kendal Broadbent, who informs me he found it feeding on the berries of a species of *Ficus*, on the Goldie River.

PITTIDÆ.

90.—PITTA NOVE-GUINEÆ, *Mull. and Schl.*

During certain seasons this *Pitta* appears to be tolerably plentiful, and specimens have been obtained by nearly every collector visiting New Guinea. They are distributed over the whole of the south-east coast and on the adjacent islands. All the specimens obtained near Port Moresby were from small patches of scrub and jungle in the ravines and water-courses on the hill sides. During the great drought of 1877–8 no *Pittæ* were to be found in the district, but during March and April, 1878, they returned in considerable numbers.

91.—PITTA MACKLOTHI, *Temm.*

One specimen, an adult male in fine plumage, iris dark-brown, bill black, in Mr. Broadbent's collection.

EUPETIDÆ.

92.—EUPETES NIGRICRISUS, *Salvadori*; *Ann. Mus. Civ. St. Nat. Genov. IX*, p. 36 (1876).

Mr. Goldie and Broadbent obtained this species on the Goldie River, about forty miles inland from Port Moresby. In the female there is an indistinct line of whitish over the black lores and over the black behind the eye and ear coverts; the whole of the primaries, except the outer edges of the inner feathers, and the under surface of the tail feathers, with the under tail coverts, are black; in other respects like the figures of *E. cœrulea* in Gould's Bds. of New Guinea—iris red; bill, legs, and feet black.

Broadbent informs me this species frequents the thick parts of the scrubs, and its actions are not unlike those of the *Psophodes crepitans*; its voice is loud and clear.

Three specimens from Mr. Broadbent's collection.

Loc., mountain scrubs, Goldie River.

CORVIDÆ.

- 93.—*CORVUS ORRU*, *S. Mull.*; *Ramsay, P.L.S., N.S.W., vol. I, p. 392*; *Sharpe, op. cit., p. 501*.

On comparing the black crows obtained on the Laloki and about Port Moresby, with those obtained by the Rev. George Brown at New Ireland and Duke of York Islands, I find no material difference between them, and, notwithstanding the valued opinion of so high an authority as my friend, Mr. R. B. Sharpe (*P.Z.S.*, 1877, p. 105, note 1), I believe both will prove to be identical with *Corvus orru*.

- 94.—*GYMNOCORAX SENEX*, *Less*; *Sharpe, Cat. B. III., p. 50, id. Journ. Linn. Soc., Zool., XIII, p. 501*; *Ramsay, P.L.S., N.S.W., vol. I, p. 392*.

Specimens of this species were obtained in the open forest land about the Laloki. These birds were not so plentiful as at the time of Mr. Goldie's first expedition to Port Moresby; perhaps the extreme drought, which was the means of causing many species to visit the coast, was instrumental in driving this species away. They were also found a considerable distance inland.

"Bill horn blue, iris white, skin round the eye bright orange-yellow, legs blackish-brown." (K.B.)

ORIOIDÆ.

- 95.—*ORIOULUS STRIATUS*, *Quoy and Gaim.*; *Ramsay, op. cit. I, p. 391*; *Sharpe, op. cit. XIII, pp. 82, 319, 500, et Cat. B. III, p. 210*.

Tolerably plentiful all along the South Coast; in habits and actions it closely resembles the Australian members of the genus.

- 96.—*SPHECOTHERES SALVADORII*, *Sharpe*; *Cat. B. III*, p. 224, pl. XII; *id. Journ. Linn. Soc. Zool. XIII*, p. 500; *S. flaviventris*, *Ramsay, op. cit.*, vol. I, p. 391.

This species is very numerous, and, in fact, may be looked upon as one of the most common birds in the district. They are usually found in the fig trees, the fruit of which they seem particularly fond. The young males resemble the female in plumage.

S. flaviventris must be omitted from the list of Port Moresby birds, having been recorded by me in error from that locality.

STURNIDÆ.

- 97.—*EULABES DUMONTII*, *Less*; *Sharpe, Journ. L. Soc. Zool.*, vol. XIII, p. 318; *id. p.* 501; *Ramsay, P.L.S., N.S.W.*, vol. I, p. 392.

Abundant everywhere along the coast and also inland.

98.—*EULABES ORIENTALIS*.

Mino robertsoni, *D'Alberty*; *Ibis*. 1877, p. 368.

Not plentiful. Morton and Goldie obtained it on the Laloki River, and Broadbent some thirty miles inland. The young have the head, throat, back, and wings black; above the chest, yellow mottled with black; and the breast and abdomen greenish black, with the tips of the feathers yellow; legs and bill yellow.

Total length, 8·5 to 9 in.; wing, 5·3 in.; tail, 2·8; tarsus, 1·35; bill from forehead, 1 in.; from the nostril, 0·65; from gape, 1·2 in. (*juv.*).

- 99.—*CALORNIS CANTOROIDES*, *Less*. *Sharpe, t. c.*, p. 318; *id. p.* 501. *C. cantor*, *Ramsay, op. cit.* I, p. 38.

Plentiful in all the districts surrounding Port Moresby, and also obtained inland as far as the Goldie River.

100.—*CALORNIS METALLICA*, *Temm.*

Calornis viridescens, *Gray*. *Sharpe, t. c.*, pp. 318, 501.

I can see no difference between the long-tailed glossy starlings from Duke of York Island, Cape York, Trinity Bay, and Port Moresby; they are probably all one and the same species as described by Temmink under the name of *O. metallica*.

CRATEROPODIDÆ.

101.—POMATOSTOMUS ISIDORI, *Less.*

These birds were met with in small flocks of from five to ten in number; they were particularly active and restless in their movements, flying from tree to tree, hopping about the branches, and chasing each other from limb to limb. When feeding, they usually resort to the ground under the trees, their food being insects and their larvæ. I have received no information on their nidification; but in this they will doubtless be found to resemble the Australian members of the genus, all of which build a somewhat bulky flask-shaped nest of sticks, and lays five to eight eggs of a sienna-grey or brown, with darker hair-lines and marblings over the whole surface.

The eggs of all the Australian species have the peculiarity of being easily washed white; the coloring matter, which appears to be confined to the surface of the shell, is readily removed with little water by gently rubbing. This peculiarity I have also observed in the eggs of the Bronze Cuckoos (*Lamprococcyx*).

LANIIDÆ.

102.—RECTES FERRUGINEA, *Bp.*

These birds traverse the scrubs among the larger branches of the trees, in flocks of ten to fifteen in number, searching for insects, which are their principal food. They were by no means rare, and frequently accompanied by a pair or more of the black fork-tailed fly-catcher, *Dicrurus carbonarius*.

103.—COLLURICINCLA BRUNNEA, *Gould, P.Z.S., pt. VIII, p. 164;*
id. Handbook Bds. Aust. I, p. 223; Sharpe t. c. p. 499.

This is apparently a very common bird in the neighbourhood of Port Moresby and further inland. The New Guinea birds of this species are of a lighter and more ashy tint than those I have received from North Australia.

104.—COLLURICINCLA MEGARHYNCHA.

Musicapa megarhyncha, Quoy and Gaim., voy. de l'Astrolabe,
pl. 3, fig. 1. Ois. p. 172.

This species was obtained in the dense scrubs on the Laloki

River. In its habits and actions it resembles the N. S. Wales *Colluricincla rufigaster*, Gould, to which species it is most closely allied, if not identical. *O. parvissima*, Gould, of which I have examined numerous specimens, appears to me to be quite a distinct species.

105.—*CRATICUS CASSIUS*, Bodd; Sharpe, *t.c.* p. 499; *id.* p. 317.

This species is numerous about Port Moresby and on the Laloki River, and frequents the open country, usually being found in flocks of five to ten in number during the winter months.

106.—*CRATICUS MENTALIS*, Salvad. and D'Alb. *Ann. del. Mus. Civ. di St. Nat. Genov. VII*, p. 824 (1875); Sharpe, *t.c.* p. 317 and 499; Ramsay, *op. cit.* I, p. 392.

This is a smaller species than the preceding, and not so plentiful. Mr. Goldie obtained it on the Laloki River during his first expedition, and towards the south-east in February last. The young have the head marked with sagittate spots of brown, and nearly the whole of the upper surface of the same tint.

107.—*CRATICUS QUOYI*, Less.; Voy. *Coq. pl.* 14; Ramsay, *op. cit.* p. 392; Sharpe, *t.c.* p. 499.

This species was found to be rare in the Port Moresby district, two only being obtained on the Laloki River; they do not differ in any way from the Queensland specimens.

PACHYCEPALINÆ.

108.—*PACHYCEPHALA MELANURA*, Gould.

Tolerably common on Coutance Island; none were obtained near Port Moresby.

109.—*PACHYCEPHALA COLLARIS*, Ramsay, *P.L.S. of N.S.W.*, vol. III, p. 74.

This fine species, which comes nearest to Dr. Gray's *Pachycephala chlorura*, was obtained on Teste Island. The female, however, is quite different from the sex of that species; the male has no trace of black in the tail, which is quite uniform in colour, even to the very tips; the bill is comparatively larger and

stronger than in any other species I have met with. Total length, 6 in.; wing, 3·5; tail, 2·6; bill, 0·9; from gape, 1 in. ♀ Total length, 6 in.; wing, 3·7; tail, 2·7; bill, 0·9; from gape, 1 in. ♂

110.—*PACHYCEPHALA*, *sp.*

One specimen, a male, closely allied to *T. collaris* and *melanura*, but having an ashy-grey tail, and the forehead and ear-coverts jet black, the crown blackish, becoming slaty-black on the occiput; the yellow collar is intercepted on the head and neck; bill strong; black throat-band narrow.

Loc. Teste Island.

111.—*PACHYCEPHALA FULIGINATA*, *Ramsay, P.L.S. of N.S.W., vol. III, p. 74.*

This was the only species of *Pachycephala* obtained near Port Moresby; it comes from the Laloki River, where it was not common. The female, obtained by Broadbent, has all the upper surface greyish ashy-brown, with faintly darker striæ down the centre of the feathers on the head, inter-scapular region, and upper tail-coverts; wings and tail dark brown, lighter below; the primaries very narrowly, and the secondaries and coverts margined with ashy; throat white, with short brown shaft-lines; the chest shaded with light ashy-brown, forming an indistinct cross-band, and, like the throat, the feathers are centered with brown shaft-lines; breast creamy white; abdomen, flanks, and under tail-coverts white; under wing-coverts and axillaries creamy-white; inner margin of the primaries and secondaries below whitish. Total length, 5·2; wings, 3·15; tail, 2·4; tarsus, 0·7; bill, 0·6.

112.—*PACHYCEPHALA BRUNNEA*.

Eopsaltria brunnea, *Ramsay, P.L.S. of N.S.W., vol. I, p. 391.*

All the specimens of this species obtained were shot in the scrubs on the banks of the Laloki River. I have received no information on its habits, which I much regret, as I have grave doubts as to its genus; the large bill would place it with the *Pachycephalinae*, although the wings do not altogether agree with those of the numbers of that genus.

CAMPEPHAGIDÆ.

- 113.—*GRAUCALUS STRENUA*, Schleg., *Ned. Tijdschr., Dierk. IV*,
p. 44 (1871).

Mr. Goldie's collection contains some fine examples of this species, they were obtained some 15 miles inland from Port Moresby. I believe this is the largest billed *Graucalus* known.

- 114.—*GRAUCALUS MELANOPS*, Lath ; Gould, *Bds. Aust., fol., vol.,*
pl.

I have seen several specimens of this species from Port Moresby, none of which appear to me to differ from those of the same species found in Northern Queensland.

- 115.—*GRAUCALUS ANGUSTIFRONS*, Sharpe, *Journ. Linn. Soc. Zool.*
vol. XIII, No. 66, p. 81 (1876).

Although somewhat similar to *G. hypoleucos*, this species is quite distinct, and may at once be distinguished by the paleness of the color on the head and the deep black frontal band, the feathers of the lores and at the base of the upper mandible on the forehead are slightly raised above adjacent feathers.

- 116.—*EDOLISOMA MELAS*, S. Mull.

Lanius melas, Less. and Garn.; Less. *Man. d'Orn. I*, p. 128 (1828)
Campephaga marescotii; Homb. et Jacq., *Voy. au Pole, Sud,*
pl. X, fig. 2.

This species is comparatively rare, two obtained were shot on the Laloki River.

- 117.—*GRAUCALUS (EDOLISOMA) PLUMBEA*, Mull.

Broadbent's collection contains an adult male of a species of *Graucalus* which I think must be referred to this species. It is closely allied to *G. jardinii*, a little smaller, and has a short robust bill. The lores are black, the whole of the upper and under surface plumbeous, the wings black margined outwardly, with plumbeous narrowly on the primaries, which have a line of white on the margin of the inner web; all the tail feathers except the two centre ones black; the central ones, except at the tip, and the bases of the three next on either side, washed with

plumbeous; all the under surface plumbens, the axillaries and under wing coverts, and the ends of a few feathers on the centre of the abdomen barred transversely with narrow white lines, the under surface of the quills ashy blue. Total length, 8·8; wing, 5·5; tail, 4·2; tarsus, 0·85; bill from forehead, 0·85; from nostril to tip, 0·55; from gape, 1 in.

Loc. Mountain scrubs, Goldie River. I regret I have no description of *E. plumbea*, Mull, to refer to.

118.—*EDOLHISOMA*, *sp.*

This species comes very close to *E. schisticeps* (Homb. et Jacq.) I can find no description of it in any works at my disposal, but as the bird is common in the Port Moresby district and all along the South-East Coast, it is probably an old described species. I give a short description of the bird here, by which it may easily be recognised:—

Adult Male. All the upper surface dark cinnamon, wings dark brown, the outer webs margined with cinnamon, the head of a darker and more brownish tint, lores blackish, sides of the head, throat, chest, and all the under surface rich bright crimson, paler on the under wing coverts, and towards the base on the inner webs of the quills.

Total length, 8·6; wing, 4·7; tail, 4 in; tarsus, 0·9; bill from forehead, 0·9.

There are several specimens in the collection, both males and females, the latter differ but little from the former. I was inclined to consider this bird the female of *E. melas*, but only two of this latter species were obtained while the former were by no means rare.

119.—*CAMPUPHAGA BOYERI*, *Q. et Gaim., voy. au Pôle, Sud., Ois.* *IX, fig. 3.*

I have seen specimens of this species in several collections made along the South East Coast, and at Port Moresby, Hall Sound, Katow, &c. The male has the black from the lores, extending under the throat; all the females I have examined have not any black on the throat.

120.—*CAMPEPHAGA SLOETII*, *Schleg.*

One specimen, an adult male, of this beautiful species sent by Broadbent, has the black of the throat extending well over the chest, and the yellow of the sides of the nape extends to the crown of the head.

Loc. Goldie River.

121.—*LALAGE RUFIVENTRIS*, *Homb. et Jacq., Voy. au Pôle, Sud., pl. XI, fig. 1.*

In all the specimens of this *Lalage* I have seen from Port Moresby, the flanks, abdomen, and under tail-coverts have been strongly tinged with rusty rufous; the transverse bars on the under surface are *narrow and close together*; the bills vary in size, in some 0·05 longer than in others.

MELIPHAGIDÆ.

122.—*MYZOMELA OBSCURA*, *Gould. Bds. Aust., fol. Vol. IV, pl. 67.*123.—*CONOPOPHILA ALBOGULARIS*, *Gould. Bds. Aust., fol. Vol. pl. 51.*

Both species are found abundant in the Port Moresby district, on the banks of the Laloki; the young of the latter species resemble the adult, have the under surface white, with a dull brownish band across the chest.

124.—*STIGMATOPS ALBOAURICULARIS*, *Ramsay. P.L.S. of N.S.W., vol. III., p. 75.*

Mr. Kendal Broadbent obtained this very distinct species during a trip to the south-east end of the peninsula. It was found frequenting the mangroves and trees near the sea shore on a small island off "Hater" Island. It is easily distinguished from the two Australian species by the extent of the minute silvery feathers behind the eye and near the gape.

125.—*PTILOTTIS GERMANA*, *Ramsay. P.L.S. of N.S.W., vol. III., pt. 1, p. 2.*

I have only seen three specimens of this species from Port Moresby, but I believe it is also found on the islands in Torres Straits. They were obtained on the Laloki River at a considerable distance inland.

126.—*PTILOTIS ANALOGA*, Rich.

Ptilotis similis, Jacq. et Pucher, *Voy. au Pôle. Sud. Ois.* p. 89.

Ptilotis notata, Gould; *Ptilotis gracilis*, Gould.

This species seems to be very numerous on the south coast of New Guinea, and also on the islands of Torres Straits. Specimens from Australia, obtained as far south as Rockingham Bay and the Herbert River, do not differ materially in coloration from the New Guinea specimens. Among themselves they differ considerably in size and in the extent of the back feathers, which in some form a large tuft of fluffy feathers extending over half of the upper tail-coverts; in one of the Port Moresby examples, these feathers have stiff shafts, reach to the tips of the secondaries, and are 1·4 inches in length. In this specimen, the narrow line of yellow from the angle of the mouth is continued below the eye and joins the ear-coverts. Immediately behind the eye, and on the lores, and in a narrow line below the gape, the coloring is of a darker brown, the bill is straighter and not so large in proportion to the size of the bird, as is usual with *Ptilotis similis*, or *P. notata*, of Gould, which I believe is identical with the present species.

Total length of a Port Moresby specimen, 6·5; wing, 3·2; tail, 3; tarsus, 0·9; bill from forehead, 0·7; from gape, 0·7.

127.—*PTILOTIS VERSICOLOR*, Gould. *Bds. Aust. Handbook, I.*, p. 506; *Ramsay, P.L.S., N.S.W., III.*, p. 111.

One specimen only from the Laloki River.

128.—*XANTHOTIS FILIGERA*, Gould.

The bird I have, with some doubt, assigned to this species, differs from *X. filigera*, of Gould, in having no whitish lines on the nape, and the yellow line through the ear-coverts is of a much deeper tint.

129.—*GLICIPHILA SUBFASCIATA*, Ramsay, *P.Z.S.*, 1868, p. 385; *Gould, Bds. New Guin., fol. vol. I, pl.*

Morton obtained specimens of this species from the Laloki River scrubs; they differ slightly from the type specimens figured by Mr. Gould, and may hereafter prove identical with *G.*

modesta of Dr. G. R. Gray ; it has, however, no markings on the flanks, and the indistinct curved markings are confined to the sides of the chest and breast.

130.—*TROPIDORHYNCHUS NOVÆ-GUINÆÆ*, *S. Mull.*

This is one of the most common birds about Port Moresby, traversing the district in flocks of from ten to twenty in number ; feeding in the fruit trees and frequenting also those in flower, particularly the *Erythrina*, or "coral" trees. Like the New South Wales *T. corniculatus*, they proved themselves a noisy and pugnacious species.

131.—*MELITHREPTUS ALBOGULARIS*, *Gould. Handbook Bds. Aust.*

I. p., 571 ; *Ramsay, List Aust. Bds.*, *sp.* 394.

This widely-distributed species appears to be plentiful among the scrubs on the Laloki River ; it frequents various flowering trees and shrubs. There is not the slightest difference in plumage between the Port Moresby specimens and those I obtained in Queensland. This species was very common to the south-east towards Teste Island.

CINNYRIDÆ.

132.—*CINNYRIS FRENATUS*, *S. Mull., Verrhandl. p.* 173 (1843) ;

Shelley, Mon. Cinnyr. pt. III. pl.

Judging from the number of specimens obtained, this species must be very plentiful on the south coast and at Port Moresby ; most of those obtained were collected on the banks of the Laloki River. The nest is an oblong purse-like structure, with an opening on the side, the entrance being concealed by a hood. It is suspended from the top to the end of some drooping leafy bough or vine, and composed of skeletons of leaves, mosses, spider's webs, &c., all matted and closely interwoven. The eggs are three in number, whitish or pinkish white, with reddish spots and dots, some sparingly, others thickly blotched. The young resemble the females. I have also received specimens of this species from Duke of York Islands, collected by the Rev. George Brown. It is found in Australia as far south as Port Denison, and is common at Trinity Bay and on the Johnstone River.

- 133.—*CINNYRIS ASPASIE*, Less., *Voy. Océ. Zool. I.*, p. 676, No. 100.
pl. 30. fig. 4 (1826); *Shelley, Mon. Cinnr.*, *pl. V., fig. 2.*

Specimens of this beautiful Sun-bird were obtained by Morton on the Laloki River, in habits and actions it closely resembles the Australian Sun-bird, *C. frenata*, S. Mull; builds the same kind of nest, and lays two to four eggs, white, with small blackish dots on the larger end.

This species was by no means common. On comparing it with those obtained by the Rev. George Brown at the Duke of York Islands,* I find it smaller in all its measurements, and the males from Port Moresby have a more *violet-purple* tint on the throat; the wings are browner, but this may be from immaturity; the tail is shorter, and the bill longer and narrower. From Captain G. E. Shelley's excellent monograph, I take the Port Moresby bird to be *C. aspasie*, of Lesson; and those from the Duke of York Islands I should take to be *C. aspasioides*, were it not for the lilac purple tinge on the throat; but the Duke of York birds have more of a steel-blue tinge than those from Port Moresby. The following are the measurements of a male from each locality:—

	Duke of York Islands.	Port Moresby.
Total length from nostril to tip of tail ...	3.7	3.7
Culmen	0.82	0.94
Bill from forehead ... ..	.85	0.9
Width at nostril	0.16 ♂, 0.2 ♀	0.13
" „ gape	0.2 ♂, 0.26 ♀	0.2 ♂
Wing	2.45	2.45
Tail	1.7	1.5
Tarsus	0.63	0.6

ZOSTEROPIDÆ.

- 134.—*ZOSTEROPS LONGIROSTRIS*, *sp. nov.*

Adult Male. All the upper surface greenish yellow, wings and tail dark brown, outwardly margined with greenish yellow; under wing-coverts white, tinged with yellow on the shoulders; inner webs of the quills, except at the tips, white; all the under

* Since writing the above, I find Dr Salvadori. (*Atti della Reale Acc. Sc. Tor.*, *XIII.*, 24 *Marzo*, 1878) has separated the birds from the Duke of York Islands, collected by Mr. Brown from the *C. aspasie*, of Lesson, and bestowed on them the name of *Hermotimia (Cinnyris) corinna*.

surface yellow, brightest on the throat; abdomen and under tail-coverts slightly tinged with greenish yellow on the sides and flanks; lores yellow, narrow ring round the eye white, bill yellow, tinged with brownish at the tip; feet olive grey.

Total length, 4 in.; wing, 2·5; tail, 1·45; tarsus, 0·7 in.; bill from forehead, 0·7 in., from gape, 0·75; from nasal groove to tip, 0·4.

Loc. Heath Island—(*Broadbent*).

PLOCEIDÆ.

135.—*MUNIA CANICEPS*, *Salvad.*

Donacola nigriceps (*juv.*), *Ramsay. P.L.S., N.S.W., vol. I., p. 393.*

In the Proceedings of the Linnean Society of N.S.W., above quoted, I described this species as the young of the following—*M. nigriceps*. Both are found in the Port Moresby district, frequenting the grassy slopes and ravines; but *M. caniceps* is less plentiful and was obtained further inland.

136.—*DONACOLA NIGRICEPS*, *Ramsay. P.Z.S. of N.S.W. I. 392;* *Sharpe op. cit. XIII., p. 501.*

This species is allied to *Donacola castaneothorax*, of Gould, from N.S.W., but it is easily distinguished by the much darker head, and the upper tail-coverts. They were found plentiful all over the district; but appearing only at times in large flocks, and like many of the Australian species, frequenting the undulating grass lands and borders of the scrubs.

Order COLUMBÆ.

TRERONINÆ.

137.—*PTILOPUS GESTROI*, *Salvad. and D'Alb.; Ann. Mus. Civ. Genov. VII. p. 834 (1875).*

One specimen only from Mr. Broadbent's collection.

Loc. Goldie River.

138.—*PTILOPUS IOZONUS*, *G. B. Gr., P.Z.S., 1858, p. 185.*

This species was not found plentiful near Port Moresby. "Iris white, bill red at base, yellow at tip, legs red."

139.—PTILOPUS PERLATUS, *Temm., Pl. Col.* 559 (1835).

Two specimens from Morton's and Goldie's collection, and one from Broadbent's, of this fine species were all that were obtained—two adult males in full plumage and one young, in which the lake spots on the wings were of a much less intense tint. In the colouring of the tail and under coverts they agree more with *Ptilopus zonurus* of Salvadori (*Prod. Ornith. Papuas. et Molucc.*, *Ann. Mus. Civic. St. Nat. Genov. IX.* (nota) p. 197).

140.—PTILOPUS CORONULATUS, *G. R. Gr. P.Z.S.* 1858, p. 185.

This species appears to be very plentiful. Numbers were obtained, both during Mr. Goldie's first expedition and by Morton and Blunden during his second, on the Laloki River, feeding on berries and fruit of the native figtrees.

141.—PTILOPUS PULCHELLUS, *Temm., Pl. Col.* 564 (1835).

Only one specimen of this beautiful little dove was obtained; it was shot about twenty miles inland, near the Laloki River. Iris orange, bill yellow, feet purple.

142.—PTILOPUS AURANTIFRONS, *G. R. Gr. P.Z.S.* 1858, p. 185.

Salvad. Ann. Mus. Civic. Genov. IX., p. 197.

This appears to be also a scarce species, only one was obtained by Mr. Goldie.

143.—PTILOPUS RIVOLII, *Prevost; Knip. Fig. II. pl.* 57.

I believe I am correct in assigning a large collection of white-chested *Ptilopi* before me to this species; they agree very well with *P. rivolii*, from the Duke of York group. The rose-purple of the breast is connected with the white chest band, but in some it is absent altogether, or there is visible merely a trace of this color. The white feathers of the chest are crossed with a curved bar of lemon-yellow near the tip, which gives a decided tint of yellow to the whole band; this yellow tint is also observable in the Duke of York specimens, when fresh, but by degrees it fades out. Mr. Goldie's and Broadbent's collection contained a large series, males, females, and young, from Teste Island. The young are of a uniform green, having only the lower part of the

abdomen, under tail-coverts, and crissum, yellow; this would seem to separate them from *P. prasinorrhous*, of Dr. Gray; but I think this last species is founded only on an immature male of *P. rivolii*. *P. strophium* of Mr. Gould appears to be much the same in plumage, but larger. The rose-purple on the chest is only attained by adult birds, many in the series being without it. I am inclined to look on *P. rivolii*, *P. strophium*, and *P. prasinorrhous* as mere varieties of one and the same species.

Hab. Deboyne Island, Teste Island, Cloudy Bay, Blunden River, &c.

I can find but little, if any, difference between this species and *P. bellus*, of Sclater—except it be in the extent of red on the front. The yellow of the breast fades out in dried skins; the red on the fore part of the head extends to opposite the iris.

Total length, 9 in.; wing, 5.1 in.; tail, 3.1; tarsus, 0.83; bill, from forehead, 0.9; bill, from gape, 1.1.

144.—*PTILOPUS SUPERBUS*, Temm. Ramsay, *P.Z.S.* 1876, p. 114; Gould, *Handbook Bds. Aust. II*, p. 108.

Several specimens were obtained by Mr. Goldie during his first and second expedition, and by Mr. K. Broadbent; they are quite the same as the Queensland specimens.

145.—*MEGALOPREPIA POLIURA*, Salvad. Ann. Mus. Civic., Nat. Hist. Genova XII, (1878), p. 426.

Megaloprepia puella, Ramsay, (nec Less.), *P. Lin. Soc. N.S.W. I*, p. 394; *id III*, p. 103.

One of the most common species, taking the place of *M. assimilis* and *M. magnifica*, and differing from *M. puella*, of Lesson, in having the tail below grey.

146.—*CARPOPHAGA MÜLLERI*, Temm., *Pl. Col.* 566 (1835).

This fine species appears to be plentiful, the collection contains many specimens. The sexes are alike in plumage, and travel about in pairs, feeding on various berries and wild fruits.

147.—*CARPOPHAGA ZOEE*, Less., *Voy. Coq. Zool. Atlas*, pl. 39 (1826).

This appears to be a rare species, as only one or two were obtained during the expedition; "iris white, bill black, feet

purple-red" (K. B.) ; latterly Broadbent obtained several specimens far inland on the mountain ranges.

- 148.—CARPOPHAGA PINON, *Quoy. and Gaim. Voy. de l'Uran. Zool.*, p. 118, pl. 28 (1824).

This fine pigeon proved to be one of the most plentiful ; they were found associating in flocks of eight to ten in number, and were often found feeding in the native fig trees in company with *M. spilorrhoa* and *P. coronulatus*.

- 149.—CARPOPHAGA VAN-WYCKII, *Oass., Proc. Acad. Philad.* 1862, p. 320.

A large number of this species were obtained on the south-east end of the island, on Deboyne Island, and at Bramble Haven.

I find no difference between these and those from the Duke of York Islands.

- 150.—CARPOPHAGA (*Globicera*) PACIFICA, *Gm. ; Salvadori, Att. della Reale Accad. Sc. di Torino XIII*, 24, Gennaio (1878).

Several specimens, agreeing well with Dr. Salvadori's description.

Loc. Teste Island, South East Cape, &c. (*Goldie, Broadbent, Blunden.*)

- 151.—CARPOPHAGA RUFIGASTER, *Q. et Gaim., Voy. Astrol.* p. 245, pl. 27, (1830).

C. rufiventris, *Salvad., Ann. Mus. Civic. di St. Nat. Gen. IX*, p. 201.

One specimen only obtained by Broadbent, 40 miles inland.

The figure in the *Voyage de l'Astrolabe* is not good, and without the description would be unrecognisable ; the rump and upper tail-coverts should be of the same tint as the basal two-thirds of the tail of a rich bronzy purple. "Iris, skin round the eye, and feet red ; legs black." (K.B.).

- 152.—MYRISTICIVORA SPILORRHOA, *G. R. Gr., P.Z.S.*, 1858, p. 186.

One of the most common species ; found also all over the islands in Torres Straits in immense flocks, where, at night, they frequently roost in the mangroves in such numbers as to whiten

the tops of the trees. They are found as far south as Port Denison. I believe the species found on New Ireland and Duke of York Islands to be *M. luctuosa* (or *M. bicolor*); however, it is certainly not the same as that from Australia, which must retain Gray's name of *spilorrhoea*. Eggs, two in number—white, oblong. Length 1·8 in., breadth 1·25 in. (From K. Broadbent.)

COLUMBIDÆ.

153.—*IANTHÆNAS ALBOGULARIS*, Bp.

Ianthænas rawlinsoni, Sharpe; *Nature*. Aug. 17th, 1876.

This beautiful species, first obtained by Messrs. Broadbent and Petterd during Mr. Stone's expedition, seems still to be rare; it was only met with on one or two occasions. Morton obtained one, and I think a bird in Mr. Goldie's collection may also be referred to this species.

154.—*REINWARDTENA REINWARDTII*, Temm. *Pl. Col.*, 248 (1825); *Salvad. Ann. Mus. Civic. Genov. vol. IX.*, p. 203 (1876-7).

Two specimens, adult male and female, from Broadbent's collection, obtained in the mountain scrubs, about forty miles inland from Port Moresby. "Iris and skin round the eye and the base of the bill red, tip of bill black, legs and feet red." (K.B.).

155.—*MACROPTYLIA AMBOINENSIS*, Linn. *Syst. Nat. I.*, p. 286, n. 38 (1766); *Salvad. Ann. Mus. Civic. St. Nat. Genov. XII.*, 431.

Found frequenting the more dense parts of the scrubs, on the banks of the Laloki River. I have seen specimens from the Aru (?) Islands, Hall Sound, and the Duke of York Islands.

Family GOURIDÆ.

156.—*GEOPHELIA HUMERALIS*, Temm. *Trans. Linn. Soc. XIII.*, p. 128 (1821).

One specimen only obtained.

157.—*GEOPHELIA PLACIDA*, Gould. *Handbk. Bds. Aust. II.*, p. 145,

Very common everywhere in the more open parts of the country; usually found in pairs or small troops of four to six in number. I find no difference between the present specimens and those from Rockingham Bay.

- 158.—*CHALCOPHAPS CHRYSOCHLORA*, *Wagl., Syst. Av. Columba sp.*
79 (1827).

Common in the scrubs; found feeding on the ground. The plumage is of a slightly darker tint than the New South Wales individuals.

- 159.—*CHALCOPHAPS STEPHANI*, *Pucher and Jacq. Voy. au Pôle.*
Sud. Zool. III., p. 119 (1853).

Not common. On comparing the Port Moresby specimens with those obtained by Rev. George Brown on Duke of York Island, I found the former of a much deeper tint both on the back and breast. The young are of a dull blackish brown above, the tips of the wings, wing-coverts, and scapularies margined with rufous; a tinge of rufous on the front and sides of the head; the under surface is of a slaty grey on the centre of the chest and abdomen, on the remainder blackish slate color; the tips of the feathers rufous on the chest.

- 160.—*CHALCOPHAPS JOBIENSIS*, *Schleg.*

Chalcophaps margaritæ, *Salvad. and D'Alb. Ann. Mus. Civ. Gen.*
VII., p. 836 (1875).

This beautiful species appears to be rare both at Port Moresby and elsewhere on the South Coast. Its range also extends on to New Ireland and Duke of York Island.

- 161.—*GOURA ALBERTISI*, *Salvad. Atti. R. Ac. Sc. Tor. IX., p. 680.*
t. VII. (1876).

During Morton's stay at the Laloki River this magnificent bird was found frequenting the scrubs on the banks of the river in immense numbers, sometimes flocks of from ten to thirty in number were met with. They frequent the ground under the native figtrees, and other berry-bearing trees and shrubs, feeding on the fruits knocked down while other species of pigeons and doves are feeding above them; when disturbed they betake themselves to the lower branches of some neighbouring tree, from whence they are easily shot. During the heat of the day they prefer the more dense parts of the scrubs, where, perched

upon some low branches, they may be seen preening and cleaning their feathers. On one occasion a small troop was met with on a dry sandy part of a scrub, dusting themselves like barn-door fowls in the sand. The crest, which sometimes obtains an expanse of 8 to 9 inches, seems to be immovable, always being carried in the same position. During September to December, before the severe drought had broken up, the *Gouras* were so plentiful, that nearly two hundred of these fine pigeons were shot. Like other species of *Goura*, the gizzards of all examined contained one very large pebble, frequently of quartz, the largest obtained being about $1\frac{1}{2}$ inches in diameter. The natives of Port Moresby prize these pebbles very highly, wearing them suspended round their neck, rolled up in a leaf, as a charm, believing that this insures success in hunting.

Hab. Cloudy Bay, Blunden River, the Laloki and Goldie Rivers, &c.

CALCENADIDÆ.

- 162.—*CALCENAS NICOBARICA*. *Linn. Syst. Nat. I.*, p. 383, n. 27 (1766)
Salvad. Ann. Mus. Civic Genov. vol. IX., p. 208.

Large numbers of this fine pigeon were obtained on Deboyne Island and the adjacent islands. There is no difference between these individuals and those obtained by the Rev. George Brown on New Ireland and Duke of York Islands.

GALLINÆ.

MEGAPODIDÆ.

- 163.—*MEGAPODIUS DU-PERREYI*, *Less. Salvadori and D'Albert, t. c.*
p. 838; Ramsay, op. cit. I., p. 394; *id op. cit. III. p.* .

This is the common species, usually found in the scrubs on the banks of the Laloki River. The mounds resemble those of the Queensland *M. tumulus*, being heaps of leaves and debris scratched together to the height of about four feet and about ten feet diameter at the base. Eggs of a rich ocraceous or pinkish brown, 3.2 in length by 2.06 in breadth.

- 164.—*TALEGALLUS FUSCIROSTRIS*; *Salvadori, Ann. Mus. Civic. Genov. IX., p. 334.*

Megapodius cuvieri, *Less. Ramsay, P.L.S., N.S.W., I., p. 394, id. vol. II, p. 112.*

This New Guinea species is about the same size as the Australian *Talegalla*. The eggs are of the same shape and form, and of the same color as those of all the species of *Megapodius* that have come under my notice. The eggs of the *Talegalla* proper, are of a pure white, and different in texture from those of the genus *Megapodius*.

This species was by no means plentiful, only a few specimens being secured.

PERDICIIDÆ.

- 165.—*SYNOICUS CERVINUS*, *Gould. Bds. Aust. Handbook, II., p. 195.*

This species is not uncommon in the grassy islands in the Straits, and was also procured near Port Moresby by Mr. Goldie, Morton, and Broadbent. The eggs are five to seven in number, creamy white, with minute dots of brown. Length 1·2 in., breadth 0·98 in.

Order GRALLÆ.

IBIDÆ.

- 166.—*NUMENIUS CYANOPUS*, *V.; Gray, Handlist Birds, III., p. 42.*

One specimen only obtained to the south-east of Port Moresby, at Kerapooona, Hood's Lagoon.

- 167.—*NUMENIUS UROPYGIALIS*, *Gould. Bds. Aust., fol. Vol. VI, pl. 43.*

One specimen from Kerapooona.

CHARADRIIDÆ.

- 168.—*LOBIVANELLUS MILES*, *Bodd.*

Several specimens, some from the Laloki River, others from the lagoon, near Boiara.

- 169.—*SQUATOROLA HELVETICA*, L.; Gray, *Handlist of Birds*, III, p. 13.

One specimen only, from Port Moresby.

- 170.—*ÆGIALITIS GEOFFROYI*, Wagler, *Syst. Av. Ohar.*, sp. 19.

Two specimens obtained at Kerapoona, or Hood's Lagoon, near the sea beach.

- 171.—*ÆGIALITIS HIATICULA*, Linn. *Syst. Nat.* I, p. 253.

Several specimens of both sexes, adults and young, in various stages of plumage, shot on the Laloki River. I can find no material difference between these and the European examples of *Æ. hiaticula*, except in the greater extent of white on the forehead and on the outer two tail feathers.

SCOLOPACIDÆ.

- 172.—*TRINGA CRASSIROSTRIS*, Temm.

Schœniclus magnus, Gould. *Bds. Aust.*, fol. Vol. VI, pl. 33.

This species was found abundant on all the low islands in Torres Straits.

One specimen, from Boiara.

- 173.—*ACTITIS HYPOLEUCUS*, L. Gray, *Handlist Bds.*, III, p. 46 ; Gould, *Bds. Aust.*, fol. vol. VI, pl. 35.

One specimen, from Teste Island, and one from Boiara.

- 174.—*GAMBETTA PULVERULENTUS*, Mull.

Totanus griseopygius, Gould. *Bds. Aust.*, fol. vol. VI, pl. 38.

One skin only obtained from East Cape.

RALLIDÆ.

- 175.—*RALLINA TRICOLOR*, G. R. Gray, *P.Z.S.* 1858. p. 188 ; Ramsay, *P.Z.S.*, 1875, p. 603 ; Gould, *Supp. Bds. Aust.* fol. Vol. I, pl. 78.

One specimen was obtained by Mr. Goldie on the Laloki River.

- 176.—*PORPHYRIO MELANOPTERUS*, Temm.

"Red-bills" were found common, both on the banks of the Laloki and on the shores of a lagoon near the river.

- 177.—*GALLINULA TENEBROSA*, Gould. *P.Z.S.*, pt. XIV., p. 20.
(1878).

I find the collection contains a single example, which, I believe, is referable to this species; it was shot on the edge of a small lagoon near the Laloki River.

- 178.—*GALLINULA RUFICRISSA*, Gould. *Suppl. Bds. Aust. Vol. I.*
pl. 79.

One specimen only obtained.

PARRIDÆ.

- 179.—*PARRA NOVE-GUINÆ*, Ramsay. *In lit. and Mss. Notes*,
Feb., 1878.

A fine series of this species, which, I believe, has hitherto been confounded with *Parra gallinacea*, Temm.

I transcribe, from my note-book of above date, the following description of this species which was first obtained by Mr. J. H. Shaw, who accompanied Mr. Goldie, at a lagoon, fifteen miles inland from Boiara, and about twenty-five miles west of Port Moresby.

Adult Male. Total length, 7 in.; wing, 5 in.; tail, 1·7; tarsus, 2·1; tibia, 3 in.; hind toe, 1 in.; its nail, 2·7; expanse of foot and nails, 7 in.; mid toe, 2·15; its nail, 0·9; outer toe, 2·35; its nail, 0·8; inner toe, 1·9; its nail, 1 in.; bill, from the eye, 1·25; from gape, 1 in.; length of comb from nostril to hinder margin, 1·15; its width, 0·65; its height, 0·3 (*in dry skin*). Color, bright reddish-orange (probably deep reddish flesh color in living birds). Bill, black at the tip, yellowish-red at the base; legs and feet, olive green. A small spot at the base of the bill, the crown of the head, nape, and back of the neck, interscapular region, back, upper tail-coverts, tail, breast, and sides, flanks, under wing-coverts, and both the upper and under surface of the wings, as well as the primaries and the secondaries, deep black; median wing-coverts and scapularies very dark rich olive-brown, with a slight metallic tinge of greenish and purple gloss. Abdomen and under tail-coverts white; chin, throat, sides of the head and neck, and the upper part of the chest, white; along the

sides of the head, and extending over the ear-coverts and in a narrow line down the side of the neck, separating the black of the upper from the white of the under side, is a stripe of a light glossy orange tint, which extends in a band of the same color across the chest, margining above the jet black of the breast. The female is about one-fifth larger in size.

Mr. Shaw informs me that this species was rather plentiful at these lagoons, but, nevertheless, very shy; and as the water was deep, and abounding in crocodiles, only those which were shot dead near the margin were obtained. They were found walking on the leaves of a species of *Nymphaea*, and in habits closely resemble the *Parra gallinacea* of New South Wales.

The young have the crown of the head rufous as in the New South Wales species.

HERODIONES.

Family ARDEIDÆ.

- 180.—*BUTORIODES JAVANICA*, Horsf.; Sharpe, *Journ. Linn. Soc. Zool. XIII*, p. 320; Ramsay, *List. Aust. Bds. sp.* 628; Gould, *Handbook Bds. Aust., II*, sp. 561.

A specimen of this bittern was obtained on the Laloki River. It does not differ in any way from the Cape York and Queensland birds of the same species. It was the only one seen during the expedition, but probably the mangrove flats, where this species loves to dwell, were not closely examined. In New South Wales this species is by no means rare; they are found breeding in the mangroves on the Hunter and Clarence rivers; and are common in similar situations at the mouth of the Herbert River. The nest is a scanty structure of a few dry sticks, placed crosswise on a horizontal bough; the eggs two to four, occasionally five in number, of a beautiful greenish-blue, about the size or a little smaller than the eggs of the common domestic fowl.

- 181.—*BUTORIODES FLAVICOLLIS*, Gould. *Bds. aust. fol. Vol. VI*, pl. 65.
One specimen only. Laloki River.

- 182.—*TIGRISOMA HELIOSYLA*, *Less. Voy. Océ. pl. 44; Sharpe, Journ. Linn. Soc. Zool. XIII., p. 321.*

Mr. Goldie succeeded in obtaining three fine specimens of this beautiful bittern during his excursions about Port Moresby. In every instance, I am informed, they were found sitting on the thicker branches of large trees overhanging or near to the water.

- 183.—*NYCTICORAX CALEDONICUS*, *Lath. Gould, Bds. Aust. Handbook, II., sp. 557; Ramsay, List of Aust. Bds., sp. 624.*

The Nankeen night-heron is not very plentiful in the Port Moresby district, but those specimens obtained are undoubtedly the same as the New South Wales birds, nor can I find any important differences in those from the Duke of York Islands.

- 184.—*HERODIAS GARZETTA*, *Linn. Gould, Bds. Aust. Handbook II., sp. 552.*

Specimens, which I refer to this species, were observed on the Laloki River; but only a few were obtained during the trip.

- 185.—*DEMIGRETTA SACRA*, *Gmel.*

The common white reef heron, plentiful on all the reefs at low water throughout the Straits and South East Coast. The Australian Museum possesses a very fine series of this species in various stages of plumage.

- 186.—*MYCTERIA AUSTRALIS*, *Gould.*

Several specimens of this fine bird were observed, but were too wary to admit of a near approach.

Order ANSERES.

Family ANATIDÆ.

- 187.—*TADORNA RADJAH*, *Temm.*

This fine species of wood duck seems plentiful all along the South Coast. Eggs obtained from the natives are of a creamy white. Length, 2 in; breadth, 1·6 in.

- 188.—*DENDROCYGNA GUTTATA*, *Forsten; Salvad. and D'Alb. t.c. p. 839; Salvad. t.c. p. 49; Sharpe, t.c. p. 505, Ramsay, P.L.S. N.S.W., II, p. 395.*

This is a common species on all the rivers and lagoons near Port Moresby. They breed in holes in the trees. The young attain the spots on the flanks at an early age, probably after the first month.

- 189.—*DENDROCYGNA VAGANS*, *Eyton; Salvad., op. cit. IX, p. 49; Sharpe, op. cit. p. 505.*

This species was not found to be so plentiful as the preceding; habits the same.

Loc. Laloki River.

- 190.—*ANAS CASTANEA*, *Eyton; Ramsay, P.L.S., N.S.W., III, p. 115; Gould, Bds. Aust., fol. , vol. VII, pl. 11.*

Tolerably plentiful on sheets of water of any extent, and found at times in the salt water marshes and mangrove flats at low tides.

- 191.—*ANAS SUPERCILIOSA*, *Gm. Gray, Handlist of B., III, p. 82; Sharpe, t.c., p. 505.*

Specimens, not in any way differing from our Australian birds of this species, were obtained on the Laloki River; also found occasionally on the mangrove flats and at Shaw's Lagoon.

Order GAVIÆ.

LARIDÆ.

STERNINÆ.

- 192.—*STERNA ANGLICA*, *Mont.; Saunders, P.Z.S., 187, p. Gelocheidon macrotarsa, Gould, Bds. Aust., Supp. fol. vol. I, pl. 81; Handbook, id. II, sp. 608.*

One specimen obtained by Mr. Goldie during his trip to Countance Island.

- 193.—*STERNA BERGERI*, *Lecht.; Gould, Bds. Aust. Handbook II, p. 394, sp. 601; Ramsay, List Aust. Bds., sp. 680.*

Common throughout the Torres Straits.

194.—*STERNA ANÆSTHETA*, Scop.

Sterna panayensis, Gould, *Handbook Bds. Aust. vol. II*, p. 411.

One specimen only from Port Moresby.

195.—*STERNA MELANAUCHEN*, Temm.; Saunders, *P.Z.S.* (1876),
p. 661.

Not uncommon in Torres Straits and at South Cape.

Order PYGOPODES.

Family PODICIPIDÆ.

196.—*PODICEPS NOVÆ-HOLLANDIÆ*.

P. gularis, Gould; *Bds. Aust. Handbook II*, p. 513.

Two specimens only obtained, shot by Morton and Blunden on the Laloki River. These are the only individuals I have seen of this species from New Guinea.

Order STEGANOPODES.

PELECANIDÆ.

197.—*PELECANUS CONSPICILLATUS*, Temm.

Seen on several occasions, but none obtained.

198.—*PLOTUS NOVÆ-HOLLANDIÆ*, Gould, *Bds. Aust. Handbook II*,
sp. 657; Ramsay, *List Aust. Bds.*, *sp.* 732.

Several specimens, obtained by Mr. Goldie and Mr. H. Shaw while encamped at Shaw's Lagoon, fifteen miles inland from "Boiara," a village on the coast, about twelve miles to the north-west of Port Moresby. I have also seen a specimen from the Laloki River, obtained during Mr. Goldie's first expedition.

199.—*PHALACROCORAX MELANOLEUCUS*, Vieill.

Only one specimen obtained, shot about fifteen miles inland from Port Moresby.

- 200.—TACHYPETES AQUILA, *Linn.*; *Gould, Handbook Bds. Aust. II*, p. 499; *Ramsay, List Aust. Bds.*, sp. 743.

One specimen obtained on the sea coast at Kerapoona, sixty miles east of Port Moresby.

Common throughout the Straits.

- 201.—SULA CYANOPS, *Sundevall*.

Sula personata, *Gould*; *Handbk. Bds. Aust. II*, p. 506.

This fine species is far from rare in Torres Straits, and was also met with on many of the small islands towards East Cape.

Species omitted from foregoing List.

- 202.—EUPETES GOLDIEL, *sp. nov.*

Adult.—Front and crown of the head, from the culmen, the nape and hind neck, and all the upper surface of the body, upper tail-coverts, and two centre tail feathers, and the wings olive brown; shoulders and upper wing-coverts black, those nearest the scapulars brown on the outer webs, primary quills washed with black on the basal portion of their outer webs; a stripe of black from the nostrils, taking in the lores, eye, and upper part of the ear-coverts extends to the side of the occiput, but does not extend round the back of the head; below this a stripe of pure white from the base of the lower mandible to the end of the ear-coverts; chin, throat, and chest black, bounded on either side from the chest downwards, by a stripe of rich chestnut, which widens out on the sides of the breast, and extends in a broad band to the flanks, central part of the breast, and the abdomen white, bounded on either side by a series of lanceolate black marks, which extend from the black of the chest, on either side, on to the outer webs of the under tail-coverts, but forming roundish spots in those feathers near the vent; under tail-coverts white, with a broad stripe of black on their outer webs; tail black, except the two centre feathers and the apical portion of the inner webs of the next two on either side, the two outer

feathers (at least) on either side largely tipped with white; under wing-coverts white, mottled with black, under surface of the quills brown; bill black; legs and feet and nails (*ut videtur*) light brown.

Total length, about 9 in.; wing, 4 in.; tail, 4 in.; tarsus, 1·3 in. Bill, from forehead, 1 in.; from gape, 1·18; from nostril to tip, 0·6.

Loc.—This very distinct and beautiful species was obtained by Mr. Goldie about sixty miles inland from Port Moresby.

The specimen has, unfortunately, been shot through the neck and much damaged; the black from the sides of the head may probably join, behind the white ear-coverts, to the black of the breast, the feathers are wanting in this specimen.

203.—PLECTORHYNCHA STICTOCEPHALUS.

Pycnonotus (?) *stictocephalus*, *Salvad.*; *Ann. Mus. Civ. St. Nat. Genov.* 19, Oct., 1876-7.

Total length, 9 in.; wing, 4·6 in.; tail, 4·2; tarsus, 0·95; bill from forehead, 0·9 in, from gape, 1·05, from nostril, 0·5.

Bill horn brown, legs and feet blackish slate color. The whole of the upper part of the head, occiput and nape, blackish brown, each feather narrow, pointed, and lanceolate, with the extreme tip white; sides of the face and ear-coverts dark brown, with a slight glossy tint; all the upper and under surface of the body, wings, and tail dull brown; the under wing-coverts, and inner webs of the quills of the wings and tail, on the under surface, washed with brownish buff; under tail-coverts dull white, with narrow brown shaft stripes; the shafts of the tail feathers above reddish brown. There is also an indication of a white stripe from the angle of the mouth to below the eye, but the throat and neck are in such a bad state that it is impossible to describe these parts correctly.

Loc., Goldie River.

204.—MICRÆCA ALBOFRONTATA, *sp. nov.*

A line from the culmen, to the crown of the head, and the occiput, blackish-brown; wings and tail blackish-brown, a little lighter

brown on the under surface; shoulders and upper wing-coverts blackish; hind neck, interscapular region, scapulars and back very light ashy-white. A white patch at the base of the bill on either side extends to above the eye, but not beyond it; on the lores, just in front of the eye, a small spot of blackish-brown; the chin, ear-coverts, throat, sides of the neck and the whole of the under surface, also under and upper tail-coverts, pure white; under wing-coverts dark brown; bill, legs, and feet, black.

Total length, 5 in.; wing, 3.9; tail, 2.5; tarsus, 0.65; bill, from forehead, 0.6 in.; from gape, 0.7; from nostril, 0.35; width at gape, 0.5.

This well marked species was discovered by Mr. Goldie in the scrubs of the Goldie River, at a considerable distance inland.

EXHIBITS

The Hon. W. Macleay, M.L.C., exhibited the fish *Amphisile Komis* described by him, and the shell *Vivipara Alisoni*, described by Mr. Brazier.

N. N. de Mikluho-Maclay exhibited drawings of Melanesian natives, showing the strange effects produced by *Macrodontism*.

Mr. T. A. Tenison-Woods displayed a singular instance of a photograph being converted into a negative, and all the lights reversed by an instantaneous application of electrical conditions, the explanation of which is not yet known.

Mr. Brazier exhibited a splendid series of *Oylindrella* from the West Indies and South America, also of *Strophia*, sent to him by Mr. J. H. Thomson, of Massachusetts, viz., *C. interrupta*, *chordata*, *trilamellata*, *producta*, *vignalensis*, *Turcasiana*, *perlata*, *Elliotti*, *Brooksiana*, *Hollandi*, *scabrosa*, *Blainiana*, *Hanleyana*, *discors*, *Teneriensis*, *seminuda*, *gracilis*, *decollatum*, and *Strophia Martensi*, *glauca*, *Cyclostoma rudis*, and sub-fossil.

MONDAY, OCTOBER 28TH, 1878.

The President, W. J. STEPHENS, Esq., M.A., in the Chair.

MEMBERS ELECTED.

W. B. Campbell, Esq., of Trigamon Station, Warialda.

G. H. Raynor, Esq., of Kings School, Parramatta.

The Secretary reported that F. W. Hutton, Esq., Professor of Zoology at the Otago University, had been elected an Hon. Member.

DONATIONS.

From "La Societe Hollandaise des Sciences a Haarleam."

1. Archives, Tom. XIII, pars 1—3.

2. 3 Catalogues of the Netherland Section of the Philadelphia Exhibition.

3. Sketch of Public Works in the Netherlands.

From La Soc. Entomologique de Belgique—

Compte Rendu, Serie II, No. 54.

PAPERS READ.

PLAGIOSTOMATA OF THE PACIFIC.

BY

N. DE MIKLOUHO-MACLAY and WILLIAM MACLEAY.

PART I.

(With 5 Plates.)

INTRODUCTION AND DESCRIPTION.

BY

WILLIAM MACLEAY, F.L.S.

The Sharks and Rays of the Pacific Ocean have, as a whole, from time to time, attracted their full share of the attention of Naturalists, in so far as the observation and examination of dried

or spirit preserved specimens admitted. But all who have studied the Anatomy of Fishes, as indeed of most of the vertebrates, must have ascertained that a true knowledge of an animal can only be attained by its examination in a perfectly fresh state. It is in this view that Baron M.-Maclay has occupied himself, during his stay here for the benefit of his health, in the continuation of his study of the Brains of the Sharks and Rays,* a species of investigation, which, above all others, requires the supply of fresh specimens.

While chiefly directing his attention to the Brain, the Baron has, at the same time, made such notes and illustrations of the general appearance and anatomy of the different species as seemed desirable or necessary to fill up gaps in their history.

The share I take in this paper is at the Baron's request, to identify and describe the species to which his anatomical details apply; and if in doing this, I appear, in some instances, to be re-describing species already well known, it is because I have found that even for the most simple specific characters, dried specimens cannot be relied upon; and I am anxious to take advantage of this opportunity to give careful and correct descriptions from living subjects.

As the subject proposed in the heading of this paper is an extensive one, and the Baron's work will proceed in whatever direction specimens may be procured for dissection, these papers will not appear in any particular order, and consequently, any remarks as to classification, &c., must be reserved to the last.

This paper will be limited to the Family of HETERODONTIDÆ, the CESTRACIONTIDÆ, of *Gunther, Cat. Fish, Brit. Mus., vol. VIII, p. 415.*

For many years it was believed that the only living representative of this once numerous family of sharks was the fish so well known as "The Port Jackson Shark." And though other species have since been found in other parts of the Pacific, it may still be looked upon as almost exclusively an Australian group. The period of their existence in other parts of the world is long since past.

* *Vide N. von Mikluho-Maclay Beiträge zur Vergleichendur Neurologie der Wirbelthiere. Th. 1 and 2. Leipzig, 1870.*

With the exception of a few fishes of a Ganoid character, which appear in some of the upper Silurian strata, the *Oestracionts*, as they are named by Geologists, are the oldest of known Fishes. Teeth and spines resembling those of the Port Jackson Shark are abundant in the Devonian Rocks of Europe, and they are to be traced all through the Carboniferous and Permian Periods. They are found also throughout the whole of the Mesozoic or Secondary series of Rocks, but are most abundant during the Jurassic period. The teeth of another kind of Shark (*Notidanus*) occurs during the same period for the first time. It is noticeable, as has been observed by Palaeontologists, that the Jurassic Fauna and Flora of Western Europe were very similar to those of Australia at the present day. Among plants, *Cycads* and *Araucariae*; among fish, the *Oestracionts*; among molluscs, *Trigonia*; and among mammals, *Marsupials*.

It may be necessary here to give some explanation of our reasons for rejecting the term *Oestracion* of Cuvier, which has been extensively used by the most eminent Ichthyologists for many years, and for adopting Blainville's name of *Heterodontus*, as used by Dumeril, in his *Hist. Nat. des Poiss.*, tome 1, p. 423.

The word *Oestracion* (from *κεστρον*, a pickaxe, and *αχης*, a point), was first used by Klein, in 1742 (*Missus tertius*, p. 12), as a name for the hammer-headed shark (to which it seems properly to apply), and is now used by Dumeril (*Hist. Nat. des Poiss.* tome, 1, p. 380) to designate the sharks termed by Cuvier *Zygaena*. Cuvier has also (*Regm. Anim.* 1817, t. 11, p. 129) given the generic name *Oestracion*, without assigning any reason, to the Port Jackson shark, although Blainville (*Nouv. Bull. des Sciences*, p. 121) had a year previously (1816) given to that species the generic name *Heterodontus*. It seems, then, that not only on the ground of priority, but from the meaning of the respective words, Dumeril is right in adopting Blainville's nomenclature.

As the family consists of one genus only, the characters of the group are given in the description of the genus.

HETERODONTUS, Bl.

Head short, high, with an elevated ridge over each eye. Two dorsal fins, each with a strong spine; the anterior fin opposite the space between the pectoral and ventral fins, the posterior in advance of the anal. Nostrils and buccal cavity confluent. Mouth narrow, inferior, almost terminal. Spiracle small, below and behind the eye. Teeth alike in both jaws, numerous, pavement like, and convex, those in front small, and more or less tri-cuspid, those behind large, and much longer than broad.

HETERODONTUS PHILLIPI.

Port Jackson Shark, Phillipps, Voy., p. 283.

Tabbigaw of the Sydney Aborigines.

Squalo Phillipi, Lacep. 1, p. 218.

Squalus Phillipi, Bl. Sohn., p. 134.

Cestracion Phillipi, Cuv. Regm. Anim; Less. Voy. Coq. Zool. 2, p. 79, Poiss. pl. 2; Mull. and Henle, p. 76. pl. 31; Schleg. Faun. Japon, Poiss., p. 304; Strüver, Nov. Act. Acad. Carol. Leopold, Nat. Cur. 23, 1864.

Cestracion Phillipi, Gunth. Cat. Brit. Mus. 8, p. 415.

Heterodontus Phillipi, Blain. Nouv. Bull. Sc. 1816, p. 121; Gray, Catal. Chondropt, p. 65; Dum. Elasm, p. 424.

Cestracion Zebra, Gray, Zool. Misc, p. 5; Richards, Ichth. Chin., p. 195.

Heterodontus Zebra, Gray, Chondropt. p. 64; Bleek. Verh. Bat. Gen. 26, Nieuw Nalez. Japan. p. 127, and Act. Soc. Sc. Neerl. 1, Amboyna, p. 71.

General form elongate, subcylindrical, tapering gradually from the head. Height of head at the orbit, one-seventh of the total length of the fish; length of head, from the snout to the first gill opening, one-sixth of the same, and equal to the length of the tail; profile, from the top of the head to the extremity, nearly straight, the slope being less than an angle of 45° from the vertical.

The snout is rounded anteriorly, with the mouth and nostrils on the under surface, but nearly terminal. The upper lip occupies the whole width of the head, and is much divided. At each

side there is, first, a large flat lobe, free and notched at the extremity, which overlaps the outer part of the fold of the lower lip; then there is a broad, nearly circular fold, which all but surrounds the large sub-elongate nostril, then a broad lobe terminating in a skinny flap, and in the middle, a thin semi-circular lip, exposing completely the mass of teeth on the outside of the symphysis of the mandibles. The lower lip has a large elongate fold or flap on each side, while the centre, as in the upper lip, exposes the front teeth. The jaws are identical in form and dentition. At the symphysis they seem narrow, but open out sufficiently to leave a small more or less oval space between the rami, behind that the rami approach almost to touching, and then gradually expand and spread outwards to the back of the mouth. The teeth are somewhat pavement like, but more or less round and convex, and not flat and angular, as in *Myliobatis*. The front teeth are rather small, and transversely ovate, in 10 rows, and in quite 15 series; those on the inner series more or less tri-cuspid, according to age; those in use, or which come into contact with the teeth of the opposite jaw, so far worn as only to show a transverse blunt point, and the obsolete ones, on the outside of the jaw, without trace of armature at all. The teeth on the hinder part of the "rami" are in about eight rows, and the same number of series, large, of an oblong shape, smooth, convex surface, spirally disposed, and with the 4th and 5th series very large, and twice as long as broad; in young specimens the teeth are acutely pointed.

The supra-orbital ridges are elevated, are situated on each side of the top of the head, and are about the same distance apart as the anterior angle of the orbit is from the top of the first gill opening; they can be traced in front for some distance towards the snout, in a direction approaching one another, and they terminate behind gradually above the first gill opening.

The eyes are situated on the side of, but close to, the top of the head, and immediately below the supra-orbital ridges; the pupil is horizontal and elliptical, with the upper surface less convex than the lower, and the orbit is large and twice as long as deep.

The spiracle is small, nearly circular, and about half the largest diameter of the orbit beneath the posterior margin of the eye. The gill openings, five in number, are placed at gradually decreasing distances apart; the first is more than twice the length of the fifth. The first dorsal fin takes its rise immediately behind the vertical from the root of the ventrals; the spine is very strong, blunt, compressed, three-fourths covered with skin, and about one-half the height of the fin to which it is attached; the fin itself is of a somewhat triangular shape, the anterior edge rather rounded, the summit also rounded, the hinder edge obliquely truncated, and the posterior angle rather pointed and produced. The second dorsal is situated a short distance in advance of the vertical from the anal, and is the exact counterpart of the first dorsal, excepting that it is one-third smaller. The caudal fin is rather short and deep, the antero-inferior lobe is convex on its anterior edge, about the size of the first dorsal, separated from the posterior lobe by a profound excavation which is rounded at its base, and with the posterior edge of the anterior almost parallel to the anterior edge of the posterior lobe; this last is small, triangular, and separated almost to the very extremity of the fin from the superior lobe by the prolongation of the vertebral portion. In the adult female, the space between the inferior lobes is more open. The extremity of the tail is obliquely truncate.

The anal fin is smaller than the second dorsal, but of much the same form; its apex is distant more than its own length from the commencement of the tail. The pectoral fins are very large, equal in length to one-fifth and in width to one-seventh of the total length of the fish. The ventral fins are nearly square, and are equidistant between the vertical from the first and second dorsal.

The skin is roughly shagreened, and has a slightly sericeous lustre. The colour in the fresh specimen is reddish-brown above, and yellow with a pinkish tinge beneath. A dark band crosses the inter-orbital space, and extends down the cheeks as far as the plane of the middle of the gill openings; a second dark band commences on the occiput, a

little behind the transverse band mentioned above, and extends along the middle of the back to near the first dorsal, when it divides and forms a band on each side, extending to and on the ventral fins. On that part of this black band which lies exactly between the posterior part of the base of the first dorsal and pectoral fins there is a concave curve, and from that point a black band extends to the pectoral fin. There is also another black band anterior to this, which extends from the first band in front of the first dorsal fin, and joins the second band on the pectoral; this band is a little curved (the concavity forwards), and forms with the other bands a small enclosed light-coloured triangular space. Another broad dark band extends along the back from the base of the first dorsal, and on each side of the second dorsal, to the tail. There is a lateral line along the body and tail, marking rather distinctly the line of demarcation between the dark colour of the back and the light colour of the belly. Both the dorsal fins and the anal are rather light-coloured, the caudal is darker, and the pectorals and ventrals are blackish above, and pinkish below and on the edges.

In specimens preserved in spirits, or dried, these markings entirely disappear, and they are never so vividly marked in adult specimens as in the young, as will be seen by reference to the very young specimen figured in plates 22 and 23.

The average size of the adult of both sexes is a little over three feet, and they seldom, if ever, attain a length of four feet. As the relative size of the different parts has been rendered with the greatest exactness in the accompanying plates, along with an accurate scale, I do not think it necessary to give a series of measurements.

The sexes scarcely differ in size or marking. The egg case is large (six inches long), conical, of a tough dark brown coriaceous texture, with six revolutions of a similar material spirally wound round it, forming a broadly-flanged conical screw. A good figure of it is given in Dumeril's *Hist. Nat. des Poiss.* vol. 2, pl. 8, figs. 2-3, but that author was not then certain that it was the egg of a *Heterodontus*.

This Shark is frequently caught in Port Jackson, and seems to have been found from time to time on various parts of the Australian and New Zealand coasts. It is also stated to have been found in the East Indian Archipelago and Japan ; but there seems to be some reason to suspect the identity of the Japanese species, if not of the other. Certainly, the figures given as those of the Port Jackson Shark, in the Voy. of the Coquille, pl. 11, and in Muller and Henle, pl. 31, are so extremely unlike the fish they are intended to represent, as to suggest a doubt of their being the same species ; and the form of the penta-cuspid tooth, figured by the last-named authors, has never, we believe, been seen in any of the Port Jackson adult specimens. The numerous transverse bands on the back, too, in those figures, suggestive of the specific name "zebra," are utterly unknown in the true *H. Phillipi*.

But little can be added to the history of this curious Shark. The stomach is generally well filled with fragments of shells, but not so finely comminuted as might be expected from the character of the teeth, and the bowels are often well charged with cestode worms. It is remarkably tenacious of life, but if we are to believe the accounts of the fishermen, very slow of reproduction—never having more than two eggs at a time, and only one brood in the year.

HETERODONTUS GALEATUS.

Gunth. Cat. Brit. Mus., Vol. 8, p. 416.

This species has a less elongate appearance than *H. Phillipi*, but I cannot find an appreciable difference in the proportionate measurements. I shall confine my descriptions to those points only in which it differs from that species already so elaborately described.

The head is more rounded in profile. The upper lip has the lateral flap less developed, not overlapping so much the lateral fold of the lower lip. The jaws shorter and deeper, the hinder part of the "rami" of the lower jaw being very deep. The teeth are similar as to number and distribution, but very different in form, the smaller teeth towards the symphysis of the

jaws are all acutely trilobed (the middle cusp largest), even those that have fulfilled their duty outside the jaw remain tolerably acute, while the side teeth are very elongate, with an elevated ridge along the entire length, grooved or fluted on the outer side. The supra-orbital ridges are short, much elevated, bend outwards over the eye, approach towards the front, and terminate abruptly behind. The first gill opening is three times the length of the fifth. The spiracle is a little more distant from the eye, and slightly more advanced than in *H. Phillipi*. The first dorsal fin commences rather behind the vertical from the root of the pectorals. The second dorsal commences behind the ventral, and reaches almost to the vertical from the commencement of the caudal. The spines are two-thirds the length of the fins, and the fins themselves are relatively of the same size as in *H. Phillipi*, but are pointed and falcate on the summit. The antero-inferior lobe of the caudal fin is large, vertically truncate behind, and separated from the posterior lobe (which is smaller and triangular) by an acute angle; the extremity is truncate. The anal fin reaches nearly to the commencement of the caudal. The other fins are large and shaped as in *H. Phillipi*.

The colour in the dried specimen before me is a dull pale brown on the upper parts, and a brownish white beneath. The top of the head and supra-orbital ridges from the level of the eyes backwards are black; the black patch extends backwards to near the first dorsal fin, and downwards a little, though more faintly, on the cheek; there are also some faint broad black cross-bars along the whole length of the back. A light-coloured lateral line seems to divide the darker upper from the lighter under portion, as in *H. Phillipi*.

It is probable that the colour in the fresh specimens would be a sericeous reddish-brown with the black marks much more clearly defined.

To judge by the number of specimens known of this fish it might be pronounced extremely rare. The first recorded is by Dr. Gunther (Cat. Brit. Mus. vol. 8, p. 416), and all he says of it, in addition to a short specific description, is that it is a female, 25 inches long, presented by Dr. G. Bennett, from Australia.

The only other specimen known is that from which the present description is taken. It is stuffed, and in the Australian Museum, caught, I believe, in Rose Bay, Port Jackson, and presented by E. S. Hill, Esq., of Woollahra. I have, also, in my Museum, the jaws and teeth of a specimen which was caught in Broken Bay two years ago, and unfortunately not preserved. But I think it not at all improbable that the species may not after all be of such very rare occurrence. The general resemblance to *H. Phillipi* is considerable, and fishermen are generally far from being acute observers of fish which are not of a marketable character.

HETERODONTUS FRANCISCI.

Oestracion Francisci. Girard, Proc. Ac. Nat. Sc. Philad., 1854-7, p. 196; and V.S. Pac. R.R. Exp. Fish, p. 365; Gunth. Cat. Brit. Mus., vol. 8, p. 416.

Gyropleurodus Francisci. Gill. Proc. Ac. Nat. Sc. Philad., 1862, p. 490.

Heterodontus Francisci. Dum. Ichthyol. tome 1, p. 426.

I have one specimen of this very distinct species, an adult male, 2 feet 6 inches long, from the Bay of Monterey, California. It is represented in plate 26, and is, I believe, now figured for the first time. It is a spirit specimen, and the markings, if any, cannot, of course, be represented; but in other respects, the figures may be trusted, as the specimen is in a good state of preservation and not contorted in any way. I regret that the dentition cannot be shown in the same way as in the other two species, as to do that would be to spoil the specimen.

The chief points in which it differs from *H. Phillipi* are as follow:—The head is proportionally broader and less high; the profile less steep and more convex; the supra-orbital ridges less prominent, almost continued to the snout and terminating abruptly behind the eyes; the teeth in front strongly tricuspid—the middle cusp large and pointed, those on the sides longitudinally ridged, but not as in *H. galeatus*; in fact, the lateral teeth in this species seem to be intermediate between those of *H. Phillipi* and *galeatus*. The spiracle larger and farther from and more behind the eye; the first gill opening scarcely twice

the length of the fifth, and much farther from the second than the distance between the second and third; the dorsal spines very strong, and more than half the length of the fins; the fins themselves more broadly rounded at the apex, and slightly emarginate behind; the first dorsal fin commences a little in advance of the vertical from the posterior root of the pectoral; the anal fin reaches almost to the caudal, in this particular alone, agreeing with *H. galeatus*; the antero-inferior caudal lobe large, and obliquely truncate at right angles to the anterior edge of the posterior lobe, which is small and narrowly incised at its junction with the other; the pectoral fins very large and rounded at the apex. The colour seems to have been brownish black above, and brownish white beneath; the scattered black spots on the body and fins mentioned in the descriptions of the fish are not traceable in my specimen.

HETERODONTUS QUOYI.

Cestracion Quoyi. Freminv. Mag. Zool. 1840, pl. 3; Gunth. Cat. 8, p. 416.

Cestracion pantherinus. Valenc. in Voy. Venus, Zool. p. 350, pl. 10, fig. 2.

Heterodontus Quoyi. Dum. Ichthyol. tome 1, p. 427; teeth pl. 3, figs. 16—17.

The figure (pl. 26) is copied from the Mag. Zool. Only one specimen of this species is known; it is about 2 feet long, and was taken at the Gallapagos Islands during the voyage of the "Venus." The descriptions given by Dumeril and Gunther, the only authorities attainable by me, are short, and leave out much that it would be desirable to know, such as the form of the caudal fin, &c.; but sufficient is given to shew that the species it most resembles is *H. Phillipi*, and that it is quite distinct from that. According to those descriptions the head is proportionally smaller than in *H. Phillipi*, the snout less obtuse; the first dorsal fin commences well behind the extremity of the base of the pectorals, and has its posterior extremity prolonged over to the vertical from the ventrals; the second dorsal more distant from the posterior border of the ven-

trals ; the anal fin does not reach close to the caudal ; the spines of the dorsal fins are shorter, and the anterior teeth, figured by Dumeril, are acutely tri-cuspid, the centre cusp large and resembling those of *H. galeatus*. The colour is described as being of a reddish-brown on the superior and lateral regions, and on the fins, with round black spots irregularly disposed over the whole surface.

We thus find, that out of the vast numbers of *Heterodont* sharks which peopled all parts of the globe for myriads of ages, from the first appearance of vertebrate animals on the earth to the present day, but four species remain in existence, or, if my suspicions relative to the Japanese fish be correct, at the most only five, and those are for the most part so rare, and found in such remote and limited localities, as to lead to the belief that, as a race, they are in process of extinction. The history of these extraordinary animals is, however, not more remarkable and instructive than that of many others which geology tells us have existed and passed their allotted period on the earth, and then passed away, seemingly without a cause. But what is extraordinary is, that the Evolutionists of the present day should be able to manufacture, out of this constant succession of Life, arguments in favour of their theory. When the *Heterodonti* first made their appearance, their development seems to have been as advanced as at the present day ; they were preceded by no forms of fishes, except a few *Ganoide*s, from which they could scarcely be evolved, and the first subsequent record of the existence of Sharks was the teeth of *Notidanus*, a genus having no apparent affinity to *Heterodontus*. The traces of these Sharks have been found continuously for a vast succession of geological periods, without any appearance of deviation from the original, or approach to any subsequent creation, and the succession of these fossil evidences have been so unbroken and unvarying, that the usual excuse of the Evolutionist when met with a difficulty, "That an unexampled gap exists in the continuity of the geological periods," will scarcely avail him in the present instance.

ANATOMICAL REMARKS.

By N. DE MIKLOUHO-MACLAY.

*"Those whose specific gift of inclination leads them to
to the pursuit of other branches of biology, as morpho-
logy, physiology, embryology, etc., must have definite
names for the objects they observe, depict, or describe,
and are dependent upon the researches of the systematic
zoologist for supplying them, and should not neglect to
take his counsel, otherwise much of their work will lose
its value."*

W. P. Flower.

Address in Zoology.

NATURE, Aug. 15, 1878. Rep. of Brit. Assoc., 1878.

These words of Professor Flower express with perfect correctness the principal consideration which induced me, in addition to my work in comparative neurology, to collect, also, sufficient material for a systematic treatise, which should serve as a supplement to, or commentary on the former.

The present work I regard, then, as nothing more than an *illustrated catalogue* of the group of fishes which interest me from the standpoint of comparative neurology; and, since a favourable opportunity presents itself, the appendix or commentary appears before the body of the work (the continuation of my "Contributions to Comparative Neurology").*

During my travels from 1870 to 1878, I have never neglected to collect materials for my studies on the brain, and, wherever it was possible, to carry on investigations on that subject. But, since the books necessary for the more exact determination of the objects under investigation were not everywhere at my command, I have always taken ample notes, and above

* *N. von Miklouho-Maclay. Beiträge zur Vergleichenden Neurologie der Wirbelthiere, I. und II., Leipzig, 1870. Verlag von W. Engelmann.*

all, as far as possible, made exact sketches, in order afterwards to identify the species in places where libraries or Museums exist. So, by degrees, a considerable quantity of notes and drawings have accumulated, and of these, after making a critical selection, I intend to publish the more important.

In order to satisfy all the demands of Systematic Zoology, I requested my esteemed friend, the Hon. William Macleay, to take in hand the systematic descriptions, as well as the entire editing of the first section of the work, limiting myself, for my part, in addition to the descriptions of the plates, to some anatomical remarks. Since our respective points of view do not agree in all cases, it is possible that considerable contradictions may appear in the text. But the most faithful, and as far as possible, *objective* representation of the observed facts seems to both of us a *sine quâ non* of scientific investigation, so I believe that the colouring of particular parts of the text (provided on that account with our respective signatures) due to subjective outlook, does not run counter to the demands of a scientific co-partnership.

As exact figures, in addition to their greater clearness, render unnecessary long descriptions, I have always put great weight upon them; yet I must state, in accordance with truth, that I can by no means declare myself satisfied with the accompanying lithographic plates, and have, on that account, determined in future to have all my sketches (those of the Catalogue of the *Plagiostomata* included) reproduced by means of photo-lithography.

There remains for me, in this case, therefore, no other resource than to attempt to correct "verbally," in the explanation of the plates, the most important inaccuracies of the drawings as compared with nature.

Besides, the Hon. William Macleay, to whom I am very much indebted for the greater part of the material investigated, I must also express my obligations to Mr. E. P. Ramsay, Curator of the Australian Museum, who has obtained for me material of various kinds for my neurological studies, and has also always allowed me, in the most friendly manner, to make use of (to draw, photograph, and measure) the collection under his care, which was

important for purposes of comparison. Lastly, I have to thank Mr. W. A. Haswell, who has taken the trouble to translate into English my German manuscript.

In writing down these remarks, the incompleteness of the research, in many parts, has often struck me; questions which I was not in a position to answer presented themselves on all sides. Fain would I have filled up these hiati, time, however, would not permit. I allow myself, then, to publish these imperfect researches, since much that is new (the brain of *H. Phillipi**, the dentition of *H. galeatus*) has been gained by this investigation; and since, in the second place, I cannot tell, on account of my nomadic mode of life, when and where I shall have the opportunity of prosecuting this work further.

As regards the *material*, which has served for the carrying out of this part of the work, for the species *H. Phillipi*, I have had no lack of material; during the now seven months of my stay in Sydney, I have obtained for investigation, thanks to the assistance of the Hon. William Macleay and Mr. E. P. Ramsay, seven or eight fresh specimens. No embryos, unfortunately; the youngest animal of this species that I have seen was 225 mm. (8·9 inch) in length, the largest 1010 mm. (4·33 in.)

For the species *H. galeatus*, I had only *one* specimen (belonging to the Australian Museum) "to look at," as well as a pair of jaws of this shark in the Macleay-Museum.

Of the species *H. Francisi*, I have also had only *one* specimen "to look at"—that preserved in spirit in the Macleay-Museum.

ON THE DENTITION OF THE HETERODONTI.

1.—DENTITION OF THE YOUNG HETERODONTUS PHILLIPI. *Bl.*

The peculiar dental armature of the *Heterodonti*, assigning them as it does a characteristic and seemingly isolated position

* The description of the brain will appear in part III. of my "Contributions to Comparative Neurology."

in the series of *Elasmobranchii*, induced me to regard the investigation of the dentition of the *embryonic* stages of that genus as a matter of high interest and importance. Unfortunately, I could procure no *Heterodontus* embryos, but this proved not to be an insuperable obstacle, as the examination in young specimens of as much as 225 mm. (8.9 in.)* in length of the form of the teeth, which differ very markedly from those of the adult, affords us a glimpse into the genealogical connection of this shark with the other *Plagiostomata*. A glance at the teeth of a young *H. Phillipi* (Pl. 24, fig. 14), magnified about five diameters, is sufficient to establish the great similarity between the dental armature of the young *Heterodontus* and that of the *Notidani***. This preparation (fig 14) shows us further that at this age (225 mm. in length) not more than seventeen series (i.e., vertical rows) are developed in the upper jaw, and thirteen in the lower. In both jaws only three horizontal rows of both series are to be seen, the others come into view after the mucous membrane of the palate has been dissected off. The teeth situated in the very front of the lower jaw have three almost similar pointed cusps, while those situated further back have five points. (Vide fig. 15, Pl. 24).***

The teeth of the middle row are more or less symmetrical, and in the posterior (reserve) teeth of this row the central cusp is the largest, while the two outer take the form of inconspicuous tubercles. The teeth of the lateral rows are also longer, in proportion to their height, than those of the middle rows. On a closer inspection we see that the two anterior cusps of the lateral teeth are more perpendicular than the others, a feature which is met with in some fossil *Notidanus* teeth. (Vide *Agassiz Poissons*

* Mr. Macleay believes that this specimen had only emerged from the egg one or two days.

** This circumstance gains greater significance, when we consider that the investigation of the brain of the *Heterodontus* leads us to a similar conclusion in regard to the connections between those two genera. The brain of *H. Phillipi* stands very near the general fundamental form of the vertebrate central nervous system, and as such, resembles the brain of the *Notidani*, of the genera *Acanthias* and *Scymnus*. (Beiträge zur vergleichenden Neurology, I., p. 43.)

*** The difference between the teeth of the young *Heterodontus* and that of the adult has already been noticed by Müller and Henle as follows:—....."Zähne, in der Mitte, klein und spitz, aus drei bis fünf von der Basis gegen die Spitzen auseinander tretenden Zacken gebildet, von denen die mittlere am grössten ist, die bei alten Thieren abgeechliffen sind;"(Müller und Henle. Systematische Beschreibung der Plagiostomen, 1841 pag 76.

fossiles, vol. III, tab. 27, figs. 9 and 11). In the posterior rows of both jaws the cusps of the teeth are not yet developed.

In the jaws of a 418 mm. (16·4 in.) long young *H. Phillipi*, I found in the upper and lower jaw 20 vertical row of teeth. In the upper jaw, the two posterior rows had the character of the large pavement-like teeth, while in the lower, the three posterior rows shewed this character. In the upper jaw, it was the teeth of the last row that were the largest, on the lower, the second last.

The longitudinal ridge was much more prominent in the posterior teeth of this young animal than in older specimens. In the middle row of the upper jaw I have counted six teeth, and five in each of the posterior rows; in the lower jaw, six teeth in the middle row, and six teeth in each of the posterior rows.

The anterior teeth of the not fully adult *Heterodontus* (761 mm. long) are distinctly tri-cuspidate (vide fig. 10), while those of the adult become almost pavement-like, with an inconspicuous cusp (fig. 19, A. and B.).

2.—DENTITION OF THE ADULT *HETERODONTUS PHILLIPI*. *Bl.*

A drawing of the characteristic dentition of *Heterodontus* is given with the first description of the so-called "Port Jackson Shark."* In different scientific works** there are to be found good figures of the teeth of *H. Phillipi*, and I would certainly not have been satisfied with so few drawings had I not the intention of writing further on this subject. A few points, not yet decided, prevent me from publishing my results at the present time.

I will confine myself here to only a few remarks. The number of the teeth, as well as the general form, is, on a cursory glance, almost the same in both jaws, but a closer inspection shows a difference in both those respects between the upper and lower jaws, and also between different individuals. In one case, I have counted altogether 34 vertical rows in the upper jaw, and 31 in

* (Vide the Voyage of Governor Phillip to Botany Bay. London, MDCCCLXXXI, page 283.

** *L. Agassiz*. Recherches sur les Poissons fossiles, tome III, 1833-43, tab D., figs. 11-19. *R. Owen*. Odontography (1840-45) plates 10 and 11; and the works of various other authors.

the lower; in both jaws it was the *fifth* row (reckoning from behind forwards) that proved to be the row of the largest teeth*. In another case there were 33 rows in the upper jaw, and 32 in the lower; the row containing the largest teeth was the fourth in the upper jaw, and the sixth in the lower.

In an upper jaw of a *H. Phillipi* much younger (smaller) than the two just mentioned, I count 36 rows, the fifth being the row containing the largest teeth. The number of the teeth in the vertical rows are subject to variation; the middle row** of the upper and lower jaws has, in this case, 12 teeth, while the row of the largest teeth contains 5 in the upper jaw, and 6 in the lower. In the upper jaw of the young *H. Phillipi* already mentioned, the middle row numbers 14; the row of the largest teeth consists of 7. The *size* of the teeth in proportion to one another seems also to be by no means constant, while in some specimens the length of the largest teeth exceeds that of the teeth next in size by almost one-third; the largest teeth of another individual scarcely differed perceptibly in size from the others.

I could not ascertain whether all these variations in the number and size of the teeth are dependent on sex and age. The material employed for the above descriptive remarks on the dentition of the adult *H. Phillipi* consisted of dried jaws, to which no note of the size and age of the animal had been appended. I have been unable to find time to fill up this hiatus in the subject.

3.—DENTITION OF *HETERODONTUS GALEATUS*. *Günth.*

If we compare the teeth, in a longitudinal row, in the adult *H. Phillipi* from the anterior to the posterior members of the series, we find that the cusps in the lateral teeth (in the anterior third of the jaw) become blunter and blunter the larger the teeth become, so that it takes the form of an elongated tubercle,

* Dumeril says that it is the *fourth*. (Hist. Nat. des Poissons. Tom. I., p. 137.) This point may vary with the age or with the sex of the specimen.

** Since, as is well known, the teeth of the Selachians are independent of the endoskeleton. (Vide Gegenbaur Grundzüge der Vergleichenden Anatomie, 2 Aufl. Leipzig, 1870, p. 733), a mesial row of teeth corresponding to the middle line of the body, though occasionally present, is not always to be found. Dumeril made the same observation. (l. c. p. 133.)

which, in the large posterior teeth, is represented by a slightly elevated longitudinal line.* This longitudinal line is more or less distinctly visible in *H. Phillipi*, according to the individual.

Now, if we suppose this median longitudinal line on the posterior teeth developed into the form of a cutting edge or crest, we obtain some idea of the chief peculiarity of the dentition of *H. galeatus*.

The figures 30 and 31 are accurately drawn, with the aid of compasses, from a shrivelled, and not quite perfect pair of jaws preserved (labelled only with the name of the locality—Broken Bay) in the Macleay-Museum.

As the jaws are in the meantime preserved in the Museum as "unique," I have been unable to use them to obtain a transverse section of the large teeth.

The only perfect specimen of *H. galeatus* in Sydney at present is one in the Australian Museum, and as it is a stuffed specimen, one could merely see the anterior teeth, and only with some trouble get a glimpse of the crest of the posterior teeth. Mr. E. P. Ramsay had the kindness (for which I here express my gratitude) at my request to order the jaws to be taken out from the stuffed specimen. The stuffed museum-specimen has been in no wise injured by this, and the museum has thereby acquired a valuable anatomical preparation. Both jaws are in excellent preservation; and I am thus placed in a position to give a more complete description of the teeth** than I could otherwise have given.

I do so chiefly because the form of the teeth of *H. galeatus*, so far as I am aware, has not yet been described.***

* "*Côte longitudinal*," of Agassiz. Poissons fossiles. Lome III., page 83.

** I regret that I have only received this second jaw of *H. galeatus* after all the plates for this paper were prepared, so that I could not exchange figures 30 and 31, which only shew a part of the jaws, for a complete drawing of the well-preserved preparation in the Australian Museum. But although figs. 31 and 32 only shew a single horizontal row of teeth (the jaws from which the drawings were taken not being perfect), yet they give a correct notion of the form of the sequence of the rows, and of the number of the teeth (in a horizontal row). The curve of the row (figs. 30 and 31) is, however, only approximately correct; the preparation, which served as the original of my sketch, was so unsymmetrically shrivelled up that it permitted me to copy only the form of the teeth and the arrangement of the rows, and not the shape of the jaws.

*** In the description of *H. galeatus* by Dr. Günther (Catalogue of Fishes, vol. I., p. 416) there is nothing said about the teeth.

As in *H. Phillipi*, so in *H. galeatus*, the general form of the anterior part of the tooth-bearing surface is somewhat broader in the lower jaw than the same section of the upper, and somewhat quadrangular in shape. Figs. 30 and 31 give a pretty good representation of the form of the teeth. The anterior teeth are tri-cuspidate, the middle cusp being the most prominent, as a result of which, the front teeth appear high and narrow. In the antero-lateral teeth, the middle cusp is proportionally less elevated than the others; further back, most notably in the *reserve teeth* (*dents d'attente*) of the medio-lateral rows, a principal cusp is no longer to be recognised, the front pointed cusps being represented by a sharp sinuous ridge, provided with an obscurely dentate upper contour. This ridge is particularly well-developed in the upper jaw, while in the lower it remains always sinuous and thin. The transverse section of one of the large (elongated) teeth of the upper jaw (which, as already mentioned, I was, from lack of material, unable to make) would have a pyramidal form with one side slightly convex, and the other concave, i.e., the outer surface of the elongated (lateral) teeth is concave; the inner convex. The complete jaws in the Australian Museum afford me an opportunity of describing also the numerical characters of the teeth of *H. galeatus*.

In the upper jaw, I have counted altogether 30 vertical rows of teeth; the number of teeth in the antero-median rows proved to be 11 (of which, however, the 10th and 11th were worn down); the number of the lateral elongated teeth in the penultimate vertical row was 9. In the lower jaw I found altogether 26 vertical rows; in the middle rows I counted 15 teeth*; there were 10** in the vertical row, containing the largest teeth (the third row, counting from behind.)

* The three posterior reserve-teeth of the middle row were displaced, so that possibly this number (15) may not be quite correct.

** In this jaw, I have also remarked the two following peculiarities. The postero-lateral rows are unsymmetrical; i.e., two teeth on the one side correspond to one on the other. If we examine the teeth of these lateral rows, one after another, from without inwards, the three first elongated teeth prove to be normal, with a straight longitudinal ridge; on the fourth and fifth reserve teeth, we see a slight curving inwards of the ridge; on the sixth, the ridge is interrupted, and the base of the tooth is also somewhat incurved at the corresponding place. The places of the following reserve-teeth are each occupied by two smaller teeth. While we notice this *division* in the posterior rows, we find, on the other hand, in one of the antero-lateral rows, a *coalescence* of two tricuspidated teeth. I will not omit in the contemplated "Monographic Sketch of the Dentition of *Heterodontus*," referred to above, to give illustrations and a more thorough description of these peculiarities.

I have already mentioned that the chief peculiarity of the dentition of *H. galeatus* is the longitudinal ridge on the posterior teeth; which character, if found in fossil Plagiostomous teeth, would very probably have induced Agassiz to describe them as belonging to a new genus. If disregarding the anterior (tricuspidate) and the middle (multi-cuspidate) teeth, and regarding only the posterior (elongated and ridged), we compare the latter with the fossil Plagiostome teeth (or to speak more correctly, with the Fig. of the Atlas of the Poisson fossiles of L. Agassiz) we find (on plate 12 of the 3rd vol. of the Atlas) several figures which have very much the appearance of the lateral teeth of *H. galeatus*. These are the different teeth of *Psammodus linearis*, Agass. I must, however, add that this resemblance struck me more from looking at the illustrations (figs. 9—13) than from reading the text (Tome III., p. 107 and 108.) I believe, however, that one would be only entitled to come to a decisive conclusion after examining the fossils themselves and not merely the drawings of them.

4.—DENTITION OF *HETERODONTUS FRANCISI*. Girard.

After I had carefully examined the form of the teeth of *H. Phillipi* and *H. galeatus*, it was very interesting to me also to investigate those of *H. Francisi*. Unfortunately, there was at my service only one specimen, which, as a "Museum specimen," I could examine only from without. The anterior teeth were perfectly visible, and could be sketched without interfering with the specimen. It was otherwise with the important posterior teeth, to see which, in detail, a lateral incision of a few inches, from the margin of the gape into the cheeks would have proved very useful. I was obliged, however, to content myself with looking in through the aperture of the mouth, so that the sketching of the posterior teeth was rendered a matter of great difficulty. I succeeded, however, in making the accompanying sketch (fig. 37). The form of the teeth in *H. Francisi* resembles, on the whole, that of a young *H. Phillipi*; the front teeth were tri-cuspidate. In the posterior rows of large teeth there were no teeth so large as are found in many adult

specimens of *H. Phillipi*, as is shown in figs. 16 and 17 (pl. 24). The posterior teeth of *H. Francisi* were all of almost the same size, and shewed a distinct mesial line on their upper surface. The mesial line of some teeth was nodose.

In the upper jaw I found 25 vertical rows of teeth; in the lower jaw, 23. As regards the number of teeth in the vertical rows, I could not attain to any certainty, as the mouth could not be opened far enough to enable me to count them with precision.*

ON THE EXTERNAL GENITAL ORGANS OF THE MALE *H. PHILLIPI*.

As I have before me a large number of sketches of these parts, as seen in various species of sharks, in which, in spite of a similarity in many points, there are yet considerable variations, it appears to me expedient to postpone giving a comparative *résumé* of these drawings until in proper order, a selection of the sketches in question has been given.

In the mean time I may observe that the drawings Figs. 20—24, pl. 24—are the more deserving of attention, that they were made from fresh preparations, the parts being carefully preserved *in situ* during the preparation of the transverse and longitudinal sections.**

REMARKS ON THE ILLUSTRATIONS.

Since a faithful figure, in addition to the considerable saving of time (as well to the author as to the reader), which it is the means of effecting, has the advantage over a lengthy description of being demonstrable to the eye, and gives the reader a better idea of the object. I have, as already observed (page 319), regarded the illustrations as of primary importance. In order to obtain, as far as possible, correct outlines, which is the most important point, I have had recourse to photography, and to a

* Figures of the anterior-teeth of *H. Quoyi* are to be found both in the *Magasin de Zoologie*, 1839, and also in Dumeril. (Atlas, pl. 3, figs. 16 and 17.)

** A description—on the whole correct—of the external sexual parts of the male Plagiostomata (*organes copulateurs* or *appendices externes* or *membres accessoires*), is to be found in A. Dumeril. (Histoire Nat. des Poissons. Tome I., 1865, pag 233 et seq.) A short dissertation on the significance of these organs as "*organes destinés à une véritable intronisation*," is to be found in the same work. (Pag 240, et seq.)

convenient, if somewhat primitive method. This consisted in the preparation of outlines of the object laid on paper; the natural-size sketches, thus obtained, were then reduced by the orthodox method. To the figures prepared from photographs, the respective scales* are annexed, in order to render possible a *rough* estimate of the amount of reduction or enlargement, since the method of preparing photographs to scale is yet unknown to me.

EXPLANATION OF THE PLATES.

LETTERING FOLLOWED THROUGHOUT ALL THE FIGURES (WITH THE EXCEPTION OF PLATE 24).

a—Superior oral fold.

b—Inferior oral fold.

n—External orifice of the nasal groove.

n'—C Border of the internal fold of the nasal groove.

n''—Orifice of the nasal groove in the oral cavity.

sp—Spiracle.

PLATES 22 AND 23.

(*HETERODONTUS PHILLIPI*, *Bl.*)

Figs. 1, 2 (pl. 22) 5, 6, 7 (pl. 23).—Young *H. Phillipi*, 225 mm. in length drawn from a fresh specimen.

Fig. 1.—Posterior view of the same. The young animal shewed the peculiar marking, somewhat different from that of the adult, very distinctly, as the brownish-black stripes stood out very markedly on the very transparent skin of the young at this stage.

*—Transverse black bar which passes over the head from eye to eye, and loses itself on the cheeks. **—Characteristic mark between the dorsal and ventral fins.

Besides the very remarkable marking, the rounded form of the head and the proportionally large tail are peculiar to this stage.

* N.B.—The scale can only be relied on for a certain part of the object (the part on the same plane with it), and must, therefore, be used with caution.

Fig. 2 (pl. 22).—Ventral surface of the same (from a photograph). At this age, the male copulatory organs are shorter than the lower border of the ventral fin.

Anal fin.

Fig. 5 (pl. 23).—Lateral view of the same. The figure only shews the external contour, in addition to the marking. The undulating contour-line is meant to represent the extent of the rougher parts of the skin, covered with large and prominent bony plates (*scutella*). The anal fin, whose position and length are accurately rendered, has its form rather too diagrammatically represented in the figure, which does not shew that the fin has become somewhat shrivelled by the drying, which took place while the drawing was being executed.

Fig. 6 (pl. 23).—A very miserable rendering of a photograph of the head *from before*. The outlines, however, are correct.

Fig. 7. (pl. 23).—Head of the same animal viewed from before, and to some extent from below. From a photograph, about three times the natural size. Scale applicable only for the anterior part of the mouth (the anterior teeth for instance).

Figs. 3, 4, 8 (pl. 23).—Full-grown* *H. Phillipi*, of about 795 mm. (31·4 in.) in length. The sketches are from a specimen in the Macleay-Museum, which had been preserved in spirit for a moderate period (2–3 months†), to which circumstance is also to be attributed the stiffness of fig. 8. The marking characteristic of the species, however, I have represented as seen in perfectly fresh specimens, since it becomes indistinct only a few hours after death.

Fig. 3 (pl. 22).—View of the dorsal surface. The dorsal fins are somewhat bent to one side. The eyes are not to be seen, when the head is viewed from above, on account of the overhanging eyebrows (vide. fig. 9).

* The largest specimen I have seen in Sydney was a female of about 1,232 mm. (48½ in.) in length. As the specimen was a dried and stuffed one (by which means the shape of the head is considerably altered), its length in the fresh state was probably greater. From the external point of the one fin to that of the other it measured 602 mm. (which number also is to be regarded as only approximate).

† I received the first fresh specimen of *H. Phillipi* on the twentieth day after my arrival in Sydney; but could make drawings much earlier from specimens preserved in spirit in the Macleay Museum. As the proportions of the different parts of the body as well as the form of the fins are not much altered by the action of alcohol for a moderate time on the specimen, I found it unnecessary to waste time in making any fresh drawings.

Fig. 4 (pl. 22).—Ventral aspect. (The black line, drawn with the pen, on the lower part of the body, between the abdomen and the anus, and the anal fin is an *unnatural* representation of the slightly depressed mesial line.)

Fig. 8 (pl. 23).—Lateral view of the same.

Fig. 9 (pl. 23).—Head of a young *H. Phillipi*, about 761 mm. (22·1 in.) in length, drawn from a fresh specimen (with the aid of the camera lucida and compasses).

Fig. 10 (pl. 23).—Anterior part of the head of the same young fresh specimen viewed from the ventral aspect.

[After looking at fig. 10, compare it with fig. 29 (pl. 25) in order to obtain a correct idea of the *nasal grooves* with both their orifices.]

Figs. 11, 12, 13 (pl. 23) represent three profile-views of the mouth of the same (761 mm. or 22·1 in. long) *H. Phillipi*.

Fig. 11 (pl. 23).—Mouth closed.

Fig. 12 (pl. 23).—Mouth half open.

Fig. 13 (pl. 23).—Mouth open to its utmost extent.

PLATE 24.

HETERODONTUS PHILLIPI, Bl.

Figs. 14 and 15.—Teeth of the upper and lower jaws of the young *H. Phillipi*, figured on plates 22 and 23 (figs. 1, 2, 8.)

The sketch, of about five times the natural size, was made from a photograph (by which the increase in size was effected.) Through the carelessness of the artist who copied the photograph, the contours of the teeth are not at all satisfactorily rendered. The general form of the teeth and the number of the pointed cusps, however, is correct. The posterior reserve-teeth of both jaws are covered by the oral mucous membrane.

Figs. 16 and 17.—Teeth of the upper and lower jaws of an adult *H. Phillipi*. (The preparation which formed the original of these figures is in the Macleay Museum.)

Fig. 18.—Anterior teeth of a specimen 761 mm. (22·1 in.) in length, with three distinct cusps. A—those of the upper jaw; B—those of the lower.

Fig. 19.—Anterior pavement-like teeth of an older specimen. A—two teeth of the middle row of the upper jaw; B—four teeth of the three middle rows of the lower jaw.

Fig. 20—24.—Male sexual appendages of an adult *H. Phillipsi*.

Fig. 20.—Appendage in section from above, from the ventral aspect. The undulating lines indicate the rougher dermal covering, armed with scutes. c and c'—groove; d—spine on the outer border of the groove; f—fissure leading into a pouch situated on the under side of the appendage.

The dotted lines marked I, II, and III shew the points where the vertical transverse sections (fig. 21) are carried through.

Fig. 21, I.—Vertical transverse section through the base of the appendage and through the ventral fin; g—cartilage of the appendage and of the fin; m—muscles of the same; i—the muscular pouch ("*poche musculuse*" of Dumeril) opening into the groove and situated on the under surface of the ventral fin.

II.—Vertical transverse section through about the middle of the appendage.; g—cartilage; m—muscles of the appendage; c—groove ("*sillon*" of Dumeril).

III.—Vertical transverse section through the end of the appendage, below the spine; c—the groove divided by a thin fold (k) of the mucous membrane; f—pouch.

Fig. 22, IV.—Longitudinal section through the appendage, to shew all the connections of the groove, with the two pouches, i and f.

(These four were all made and drawn from quite fresh specimens.)

Fig. 23.—Male sexual appendages of a larger specimen. The specimen from which the sketch was made lies on the right side the ventral surface directed forwards, with the appendages crossed over one another. (This position of the appendages I have noticed in many dying and dead specimens of *Heterodontus*.) The right appendage is stretched out along the middle line of the body, the left one hanging below; it is drawn back by means of three hooks, so that the groove (c and c') is to be seen. The spine (d) is by this means "thumblike" extended and abducted.

k is a slight longitudinal fold. (N.B.—Fig. 23 as well as fig.

24 is a very wretched rendering of my sketch, and gives the impression of having been drawn, not from part of the body of an animal, but from a wooden model; the outlines, however, are correct.)

Fig. 24.—Extremity of the appendage viewed from the inner side, fixed with the aid of hooks, with the last joint flexed, in order to afford a view of the groove. Owing to the flexed position of the appendage and of the sac or pouch f, which is wide open.

PLATE 25.

HETERODONTUS GALEATUS, *Günther*.

Figs. 25 and 26.—Drawings of the *Heterodontus galeatus* from above and from the side from a stuffed specimen in the Australian Museum. In order not to alter further the appearance of the animal already considerably distorted by the process of stuffing, I have caused photographs of the animal in question to be copied. Although the whole of the general surface of the skin, with the exception of the ventral portion, is very dark, six transverse bands are visible. The band on the upper surface of the head is the most distinct. Though the colouring of this dried specimen may be somewhat different from that of the same animal in the fresh state, yet it is decidedly different from that of *H. Phillipi*®.

Fig. 27.—Front view of the head (necessarily very diagrammatic, owing to the condition of the specimen), to shew the two very prominent supra-orbital ridges characteristic of the species.

Fig. 28.—Ventral view of the anterior end of the head (also very diagrammatic) to shew the front teeth (very wretchedly rendered by the artist, but with the number correct.)

Fig. 29.—Ventral view of the anterior end of the head of a *H. Phillipi* (from a perfectly fresh specimen). The lower jaw, the labial folds, and the upper jaw are removed, to shew the nasal grooves with their two openings. On the right hand side the parts are *in situ*; on the left, a horizontal section has been made on a plane passing through both the external and the buccal narial apertures, displaying the whole course and relations of the groove.

Figs. 30 and 31.—Part of the upper and lower jaw of the specimen in the Macleay-Museum. The shape of the teeth, and their order of sequence, is carefully rendered. Cr—longitudinal ridge.

PLATE 26.

HETERODONTUS FRANCISI, Girard; and *H. QUOYI*, De Fremin.

Fig. 32.—Profile of the spirit-specimen in the Macleay Museum. Circa 708 mm. (27.9 in.) in length. In this specimen there was no characteristic colouring (stripes, bands, or other markings) of any kind to be observed, on which account only the external outlines are given. On the uniformly dark surface the lateral line was, however, to be seen. (Through the carelessness of the artist the outline, which should separate the lower surface of the body from the ventral line, has been omitted.

Fig. 33.—View of the same animal from above.

Fig. 34.—View of the head *en face* to show the form of the supra-orbital ridges.

Fig. 35.—Half-open mouth in profile, to show the labial folds and the external nasal apertures.

Fig. 36.—Anterior part of the head, regarded from the ventral side, to display the arrangement of the nasal groove, the labial folds, and the anterior teeth.

Fig. 37.—Part of the teeth of the same animal *in situ*, drawn as accurately as possible with the aid of compasses. In the lower jaw the arrangement of the accessory cusps of the lateral tri-cuspidate teeth is noteworthy. The tooth marked * shows the left, that marked ** the right accessory point of the teeth remarkably well developed. (This is a point of importance in determining to which side a tooth may belong).

Fig. 38.—Facsimile of the drawing of *Heterodontus Quoyi* de Freminville in the Magazine of Zoology, 1840. N.B.—The figure has been reversed to facilitate comparison with the others. The explanation of the figures given by M. le Chev. de Freminville is as follows :—

"Fig. 1.—Cestracion (*Heterodontus*) de Quoyi réduit environ au tiers de sa grandeur naturelle.

"1 (a).—Sa bouche vue de face.

"1 (b).—Ses dents externes grossies.

"1 (c).—Ses dents internes grossies."*

* Notice sur une nouvelle espèce de Poisson appartenant au genre *Cestracion* de Cuvier par M. le Chevalier de Freminville.
(Magasin de Zoologie publié par F. E. Guérin-Meneville. Paris, 1839.)

On an apparently new species of PENGUIN, from Campbell Island.

By F. W. HUTTON, Professor of Zoology in the Otago University.

EUDYPTES FILHOLI, *sp. nov.*

Male. The whole of the upper surface, sides of the head and throat, blue black; under surface, white. On the lower part of the neck, the dark color of the back projects in a rounded salient, so that it is more advanced here than at the upper part of the neck or at the wing. Feathers of the crown, long and narrow; those at the sides, considerably produced. A narrow band of yellow commences a short distance behind the termination of the culmen, passes over the eye, and ends in a long crest; a patch of black on the base of the hinder margin of the under surface of the wing, and a median band of the same color at the apex; lower edge of apex of wing, white internally; bill, chestnut brown; feet, flesh color, with the webs dusky; trides, dark brown.

Length, 23 inches; bill to gape, 2; culmen, 1·75; height, ·75; greatest breadth, ·35; wing, measured straight, 5·75; along the anterior edge, 65; tail, 4·5 nearly; tarsi, 1; mid-toe, 1·7; claw, ·85; hind-toe, ·4; claw, 15; length of longest crest feathers, 2 inches.

This bird was presented to the Otago Museum by one of the officers of the French War Steamer, "*Vire*," who obtained it at Campbell Island, in 1874. I have named it in remembrance of Dr. H. Filhol, the accomplished and energetic naturalist of the French Transit of Venus Expedition, who visited that island in 1874, in the "*Vire*."

In color and in length of crest, this species is intermediate between *E. chrysocome* and *E. chrysolopha*; but is easily distinguished from both by the superciliary yellow streaks commencing behind the termination of the culmen instead of between the termination of the culmen and the nostrils, and by the dark color of the back advancing on the sides of the lower neck. From *E. chrysocome* it is also distinguished by the narrowness of the bill, and the different shape of the black mark on the under surface of the apex of the wing, in which *E. filholi* resembles *E. chrysolopha*. From the latter species it is also distinguished by its color.

The following is an analysis of the known species of *Eudypetes*, all of which, except *E. diademata* and *E. catarrhactes* are in the Otago Museum. I have distinguished those species not found in New Zealand by placing them in brackets.

The specimen of *E. chrysolopha* is from St. Paul's Island, in the Indian Ocean, and was received from the Paris Museum.

Under surface, black *E. atrata*.

Under surface, white

Not crested :—

Bill, long... .. *E. antipoda*.

Bill, short and thick *E. vittata*.

Crested :—

Front, yellow.

Throat and sides of head, black... .. (*E. diademata*).

Throat and sides of head, white... .. *E. schlegelii*.

Front, black.

Yellow bands arising behind the termination of
the culmen } *E. filholi*.

Yellow bands arising in front of the termina-
tion of the culmen }

Sides of head and throat, dark blue.

Tail and crest, short (*E. catarrhactes*)*.

Tail and crest, long *E. chrysolopha*.

Sides of head and throat, black *E. chrysocome*.

* *E. catarrhactes* is a doubtful species; very likely based on a made up bird. (See Finsch in Ibis, Ser. III., v. V., p. 112.)

Notes on a small collection of Birds from the New Hebrides,
with a description of a new species of *MREULA*,

By E. P. RAMSAY, F.Z.S., &c., Curator of the Australian
Museum.

The Museum has lately received two small collections of Birds, in spirits, from the Islands of the New Hebrides group, for which we are indebted to Dr. Mackinlay, of H.M.S. "Nymphe," and to the Rev. H. A. Robertson, now stationed on Erromanga. Mr. Robertson's specimens were obtained on the mountains during a recent inland excursion on that island. So little reliable information is on record respecting the ornithology of these islands, that any additional authentic notes on their avifauna will always be acceptable.

1.—*CIRCUS WOLFFI*, Gurney, P.Z.S., 1865, p. 823.

Two fine specimens of a *Circus*, which I must, for the present, refer to this species, although they do not altogether agree with Mr. Gurney's description in the "Proceedings" above quoted. I am inclined to believe them to be only varieties of *Circus gouldii*, Bp.

Loc., Erromanga.

2.—*MREULA ALBIFRONS*. *sp. nov.*

Adult male. The whole of the head, neck, and chest, white; mantle, and all the upper and under surface, dark brown, almost blackish-brown; under tail-coverts tipped and mesially shaded with whitish; quills of the wings and tail blackish brown; tibial feathers yellowish brown; bill and legs yellow.

Total length, 7·7 in. (in the flesh, spirit specimen); wing, 4 in.; tail, 2·8; tarsus, 1·3; bill from forehead, 0·85; from gape, 1 in; from nostril, 0·6 in.

There are a few white-tipped feathers on the abdomen. The type specimen has been preserved in spirits, and has the head and neck discolored, but some purely white feathers on the chest

show that these parts were originally white in the adult, while a feather here and there on the head, seems to indicate that in the young bird these parts were of a dull smoky brown.

Hab. Mountainous parts of the island of Eromanga, New Hebrides. Received from the Rev. H. A. Robertson.

The following species have been examined and compared with this new species:—

M. vanicorensis, *Q. et Gaim.* Samoan Islands.

M. vitiensis, *E. L. Layard.* Fiji.

M. ruficeps, *Ramsay.* Fiji.

M. tempesti, *E. L. Layard.* Fiji.

M. xanthopus, *Forst.* New Caledonia.

M. pritzbuesi, *E. Layard.* New Caledonia.

M. poliocephalus, *Latham.* Norfolk Island.

M. vinitincta, *Gould.* Lord Howes Island.

It differs from all in having a purely white chest, the head and neck, which are slightly discoloured with the spirits, were, without doubt, white also in the living bird. *M. ulietensis*, Gm. I have not seen.

3.—*HALCYON JULIE*, *Heine*; *Sharpe Monog. Alced.*, pl. 86.

Several specimens agreeing well with Mr. R. B. Sharpe's description (*op. cit.*), but are somewhat larger in their admeasurements; for a description of the species from *Tutuila* in the flesh, see P.L.S. N.S.W., Vol. II., p. 141, *Hab.* Havanah Harbour, Vela Harbour, &c., Dr. Mackinlay, Rev. H. A. Robertson.

4.—*MYZOMELA CARDINALIS*.

This is probably the species alluded to by Mr. E. L. Layard (*Hist.* 1878, p. 270), but is certainly not *M. sanguinolenta*, which species is confined to Anstralia. *Hab.* Tanna; Dr. Mackinlay.

5.—*GLYCIPHILA FLAVO-TINCTA*, *G. R. Gray*.

Found throughout the groups; Tanna, Havanah Harbour, &c.

6.—*ZOSTEROPS FLAVIFRONS*, *Gm.*; *G. R. Gray*; *Voy. Ouracoo*, pl. 7, fig. 1.

Hab. Tanna; Vela Harbour, Dr. Mackinlay; Eromanga, &c. These specimens agree very well with Dr. Gray's description

(*op. cit.*), but the figure there shows a dark ring round the white eye-ring, which is not found in the skins before me.

7.—*ZOSTEROPS GRISEONOTA*, *G. R. Gray*.

There is no difference in the plumage of the sexes.

Hab. Eromanga; Rev. H. A. Robertson.

8.—*GRAUCALUS CALEDONICUS*, *Gm.*

Two specimens.

Hab. Eromanga; Dr. Mackinlay, Rev. H. A. Robertson.

9.—*LALAGE*, *sp.*

? *Lalage pacifica*, *Gmelin*.

Adult male. Head, back of the neck, wings, back and tail black, with a faint greenish metallic gloss; rump and upper tail-coverts, bluish ashy grey; chin, throat, the lower part of the ear-coverts, under wing-coverts (except the under margin of the shoulders), the basal half of all the inner webs of all the wing quills, and the whole of the under surface of the body and the under tail-coverts, pure white; tail black, with the outer three feathers on either side largely tipped with white, the fourth quill slightly tipped, and the fifth with a mere indication of white. The margins of the wings on the under surface are black, a few feathers at the base of the primaries are margined with white, no white on the first primary quill. On the upper surface of the wing, the secondaries are very narrowly margined with white, the scapularies and their coverts, largely on both webs; the central wing-coverts white, with black shaft lines, and black tips and margins, forming a broad patch of white across the wing, a little below the base of the secondaries; all the primary-coverts black, the greater ones of the secondary-coverts white on both webs at the base, and also slightly tipped with white; the lores are black, and no white extends above the eye; legs, feet, and bill, black.

Total length of the flesh, 7·1 in; wing, 3·3; tail, 3·1; tarsus, lin.; bill, from forehead, 0·7, from gape, 0·8, from nostril, 0·4.

Hab. Mountains of Eromanga; sent by the Rev. H. A. Robertson. This is, perhaps, the *L. pacifica*, *Gm.*, of which, unfortunately, I have no description to compare it with.

- 10.—*MYIAGRA MELAMERA*, G. R. Gray, *Cat. Bds. Trop. Islds. Pacif.* p. 18.

Hab. Havanah Harbour, Eromanga, &c.; Dr. Mackinlay. Males, females, and young in spirits, which I have carefully dissected; the females have rich chestnut throat, breast, and sides, as described by Dr. Gray, *op. cit.* Mr. E. L. Layard is probably in error in stating that the female (*Ibis* 1878, vol. II., No. 7, p. 271.) has the throat black. I have invariably found, that wherever the males and females in the genus *Myiagra* resemble one another, both have the throat chestnut or white.

- 11.—*ERYTHRURA CYANOVIRENS*, Peale.

Hab. Eromanga; Rev. H. A. Robertson.

- 12.—*TRICHOGLOSSUS MASSENÆ*, Bp.

Hab. Eromanga, Havanah Harbour, Tanna, &c.; Dr. Mackinlay, Rev. H. A. Robertson.

- 13.—*TRICHOGLOSSUS PALMARUM*, Forst.

Hab. Havanah Harbour; Dr. Mackinlay.

- 14.—*CHALCOPHAPS CHRYSOCHLORA*, var. *Sandwichensis*, Gould.

Hab. Vela Harbour; Dr. Mackinlay.

- 15.—*MACROPYTGIA MACKINLAYI*, Ramsay, *P.L.S., N.S.W.*, vol. II, p. 286.

Hab. Tanna; Dr. Mackinlay.

- 16.—*CALGNAS FERRUGINEA*, Forst.

Hab. Havanah Harbour; Dr. Mackinlay.

- 17.—*PTILOPUS APICALIS*, Bp.

Hab. Havanah Harbour, Vela Harbour, &c.; Dr. Mackinlay.

This is probably the species referred to by Mr. E. L. Layard as *P. Greyi* (*Ibis*, 4th Ser., vol. II., No. 7, p. 275.)

- 18.—*PTILOPUS (CHRYSAENA) CORRIEI*, Ramsay, *P.L.S., N.S.W.*, vol. I., p. 133.

Hab. Mallicola, Dr. Corrie; Vela Harbour, Dr. Mackinlay.

- 19.—*CARPOPHAGA PACIFICA*, Grn.

Hab. Eromanga; Rev. H. A. Robertson.

Description of a new species of RHIPIDURA, from Lord Howe's Island.

By E. P. RAMSAY, F.L.S., &c.

RHIPIDURA CERVINA. *sp. nov.*

All the upper surface, dull earthy brown; the frontal feathers tinged with ashy brown at the base, the lores, sides of the head, and ear-coverts, of a slightly darker tint of brown than that of the head, a line of buff over the eye; throat, whitish; chest, and all the under surface, and the under wing-coverts, light fawn color, a little paler on the under tail-coverts; wings, blackish brown, the secondaries narrowly margined on the outer web with buff, the scapularies rather broadly margined with white and buff; the coverts of the secondaries and scapularies distinctly tipped with buff; tail, blackish brown, lighter on the inner webs, the shafts of all, except the centre two feathers, white on both sides; the outer feathers, on either side, margined on both webs, and largely tipped with buffy white, all the rest, except the centre two, margined on the inner webs with the same tint; bill, black; feet and legs, blackish brown; bristles, black, extending to beyond the bill. Total length, 6 in.; wing, 3 in.; tail, 3·65; tarsi, 0·8; bill, from forehead, 0·5, from gape, 0·55, from nostril, 0·22.

(Description taken from two mounted specimens; no sex recorded.)

Hab. Lord Howe's Island, collected by Mr. George Masters.

A conversation ensued in reference to the affinities traceable between the fauna of New Zealand, Lord Howe's Island, and New Caledonia.

EXHIBITS.

Mr. Macleay exhibited a beautiful coral found at Green's Point, Watson's Bay, by Mr. J. Brazier.

Mr. Ramsay exhibited four species of Rifle Birds, gave a sketch of the history of each species, and pointed out the differences between them.

Ptilorhis paradisea (the N.S.W. Rifle bird) was plentiful in the Clarence, Richmond, and Tweed Districts; and was found as far north as Gympie, in Queensland.

Ptilorhis Victoriae he met with at Rockingham Bay, and had received specimens from Trinity Bay (Broadbent), and Barnard Island, collected by Alexander Morton.

For the Cape York Rifle Bird, Dr. Gray had proposed the name of *Craspedophora Alberti*, and *Craspedophora Magnifica* was the well-known New Guinea bird. Mr. Ramsay illustrated his remarks by beautifully-preserved skins of males, females, and young of all the four species.

MONDAY, 25TH NOVEMBER, 1878.

W. J. STEPHENS, Esq., M.A., President, in the Chair.

NEW MEMBER.

The Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c., formerly a Corr. Member of the Society, was duly elected.

DONATIONS.

Compte Rendu de la Société Entomologique de Belgique. Serie II., No. 55; from the Society.

Quarterly Journal of Conchology; from the Editor, J. W. Taylor, Esq., Leeds.

PAPERS READ.

On six new species of ANNELIDS, belonging to the Family AMPHINOMIDÆ.

By WILLIAM A. HASWELL, M.A., B. Sc., Edin.

1.—AMPHINOME NITIDA, *sp. nov.*

This species is a little over two inches in length, consisting of about forty segments of quadrilateral transverse section, be-

coming narrower anteriorly; the decrease in breadth beginning in front of the fifth setiferous segment. Posteriorly, the body tapers away slightly after the sixteenth segment; but the posterior extremity, though narrower than the middle of the body, is rather blunt than pointed. The caruncle is small, depressed, smooth, and somewhat cordiform in shape. From its anterior extremity arises the median tentacle, which is short and stout, and (in the spirit-specimen) of a red colour. The antennæ and palpi, which arise from the first somatic segment, are of a similar shape and colour; the palpi being somewhat shorter than the antennæ or tentacle. The prestomium is mesially grooved below, but not distinctly bilobed. The branchiæ, which commence on the third setiferous segment, are large and ramose, consisting of about four main branches, arising by a common root from the dorsal tubercle behind and internal to the dorsal fasciculus of setæ. These branches divide and subdivide—the ramifications ending finally with number of slightly dilated pinnules. The main branches are green in the spirit specimen, and the pinnules of the same bright red hue as the antennæ. The cirri, which are also of a red colour, are somewhat short, the ventral series being smaller than the dorsal. There are no post-anal appendages—a wart-like process representing them.

The dorsal setæ are nearly colourless, long, and fairly numerous. They consist of two distinct kinds:—one kind stouter and shorter; somewhat pointed, and possessing two rows of serrations; the other much finer and longer, free from serrations, and having near their extremity a joint or bend, from which they taper, with a slight curve, to a fine distal point. The ventral setæ are very much shorter than the dorsal, and usually only about four in number in each foot. They are stout, curved at the distal end, and finely pointed, resembling, in general form, the corresponding setæ in *A. rostrata* and *A. Jukesii* (Baird, Monograph of the Amphinomaceæ, Journ. Lin. Soc., vol. X., pl. IV.), but having the point much more acute. These setæ are dark-coloured, while the dorsal are transparent.

This species of *Amphinome* is the third described as occurring on the Australian coast, the other two being *A. rostrata*, Baird, and *A. Jukesii* Baird.

Hab. Cape Grenville. (Chevert Exped.)

2.—*AMPHINOME PRELONGA*, *sp. nov.*

This large species is about six inches long and half an inch in breadth, and the body contains forty-six segments, of quadrilateral transverse section. The caruncle is very small, and not well-preserved in the specimens. The tentacle, antennæ, and palpi are stout, dark-coloured, and sub-equal. The branchiæ, which begin on the third setiferous segment, are blackish, with lighter grey stems, and very bushy and large.

The dorsal setæ are of two kinds:—those of the one variety are long, and stout, and straight till near the extremity, when they begin to taper, and end in a fine point, the terminal tapering portion being gently curved; those of the other variety are shorter, straight, and pointed, and are beset by two rows of minute teeth for some little distance below the apex. The ventral setæ, about a dozen in number in each foot, are long, stout, and smooth, with a hooked extremity, closely resembling in form the corresponding structure in the preceding species.

Hab. Katow, New Guinea. (Chevert Exped.)

3.—*NOTOPYGOS FLAVUS*, *sp. nov.*

This annelid is one inch in length, by two-and-a-half lines in breadth, and consists of thirty segments. It is oval and flattened, slightly pointed at both ends; the posterior extremity being the more acute. The caruncle is elongated and sinuous, extending over five segments. The tentacle is longer than the antennæ and palpi. The branchiæ, which begin on the fifth setiferous segment, are small and ramose. The anal appendages are short, club-shaped. The dorsal cirri are stout and short; the ventral about the same length, but more slender in form.

The dorsal setæ are of two kinds:—some are short, stout, and simply pointed; others are longer, and bifurcated at the extremity; the shorter branch being only about one-fourth of the length of the other, and having a bluntish apex; while the longer branch is slightly bent outwards from the angle of the fork, and is continued thence to its apex, without further curva-

ture, and without serrations. The ventral setæ have all the same form as the second kind of the dorsal. Both the dorsal and ventral fasciculi are of a golden yellow colour.

Hab. Darnley Island. (Chevert Exped.)

4.—*NOTOPYGOS PARVUS*, *sp. nov.*

The length of this species is a little more than half-an-inch, and its breadth about a quarter of an inch. Its form is oval and depressed; and the number of segments is about twenty-eight. It is characterised especially by the form of the caruncle, which has the appearance of a thick smooth posterior tentacle, its free extremity reaching as far back as the fifth segment. From the anterior fixed end of the caruncle arises the median tentacle, which is smaller than the antennæ, as are also the palpi. The eyes are large and subequal. Two black spots, close together, on the under surface of the narrow prestonium, have the appearance of an accessory pair of eyes. The branchiæ, which begin on the third segment, consist on each segment of a few simple filiform processes, usually seven or eight in number, arising in a transverse row from the dorsal tubercle. The dorsal cirri are almost uniform in appearance with these colourless branchial filaments. The anal appendages are short and tubercle-like.

The dorsal setiferous tubercle is broad transversely, and the setæ very numerous; the ventral setæ are fewer, and placed close together. All the setæ, ventral, and dorsal, possess the same form. They are straight, smooth aciculæ, bifurcated at the tip; the shorter branch being less than half the length of the other, straight, and rather blunt; the longer branch has a sudden bend outwards, opposite the apex of the shorter branch, and from that point tapers to the extremity, with a slight curve inwards.

The two species above described are referred provisionally to the genus *Notopygos*. This genus contains hitherto only two species—*Notopygos cimitus*, Grube, and *N. ornatus*, Grube; and one of the generic characters given by Kinberg is a slight serration on the inner side of the longer branch of the dorsal setæ. This serration is entirely absent in the case of the two species I

have described. Possibly the definition of the genus might be stretched to admit these new species; but on the other hand, the second, which I have named *Notopygos parvus*, may not improbably turn out to be the type of a new genus.

Hab. Tacking Point. (Chevert Exped.)

5.—*CHLOEIA MACLEAYI*, *sp. nov.*

The length of this form is two and-a-half inches, and its breadth three-quarters of an inch, including the setæ of the feet. It is of oval depressed form, pointed at both ends, but more acute posteriorly. The caruncle is attached below to the first two setiferous segments; but its posterior free extremity projects as far back as the hinder border of the third segment. It consists of a larger central and two smaller lateral longitudinal folds, each covered with transverse corrugations. Along the summit of the central fold runs an irregular dark line, continued forwards to the central antenna. The central antenna or tentacle, which arises from the anterior end of the caruncle, is much larger than the antennæ proper and palpi; the antennæ are marked with an irregular longitudinal black stripe; the palpi are shorter and stouter, and pale in colour. The cephalic segment is large and strongly bilobed inferiorly. On the ventral surface of the second setiferous segment, just in front of each angle of the mouth, is a large black spot on each side, and one or two smaller ones. The first two pairs of feet have each a black spot on their anterior surface; in the third pair, this becomes a black line crossing the foot from without inwards; immediately behind which, in the fourth and succeeding segments, appears a second and shorter line crossing the ventral tubercle in the same direction. The branchiæ, which begin on the fourth somatic segment, arise from the dorsal surface of the segments, internal to the dorsal bundle of setæ; they are very large and finely pinnatifid; the stout main stem being black, and the branches pale.

There is no such marked pattern on the dorsal surface of the body as in *Ohlocia pulchella* and *C. flava*; there is, however, one indistinct, broad, oblique, dark band internal to the branchiæ;

and in the centre, two obscure dark spots, one behind the other.

The dorsal cirri are long and slender, with an irregular longitudinal black stripe; the ventral are somewhat shorter and colourless. The anal appendages are large, stout, cylindrical, and colourless.

The dorsal setæ are straight, and very long and stout. They are moderately blunt, and serrated near the apex; the serrations being between fourteen and twenty-one in number, and harpoon shaped. The ventral setæ are not so numerous as the dorsal; are very long, about equalling the dorsal in this respect, and are much more slender than the latter. They are bifurcated at the tip; the smaller branch being exceedingly short.

Hab. Cape Sidmouth. (Chevert Exped.)

6.—*EUPHROSYNE MASTERSII*, *sp. nov.*

The oval depressed body is an inch in length, half-an-inch in breadth, and consists of about forty segments. The dorsal integument of each segment is marked out into numerous polygonal areas by striæ. On the ventral surface, just in front of the mouth, are two swollen lobes, consisting of the dilated oral ends of the two halves of the first somatic segment. On the ventral surface of the prestomium, in front of and between these lobes, is a black spot. The caruncle consists of a central midrib and two crenated lateral bars, between which and the midrib, on each side, is situated a smooth fleshy lobe. Rising from the anterior end of the midrib is a short stumpy process, representing the tentacle, and at its base are the single pair of eyes. The branchiæ are ramose, and arise by as many as nine or ten distinct roots from almost the entire breadth of the foot. The main trunks divide and subdivide to form dendroidal masses, the terminal twigs of which are slightly expanded and phylloid. Behind the long slit like anal aperture, situated on the dorsal surface, is a single, large, rounded anal appendage.

The setæ are, as is characteristic of the genus, all bifurcate. Those of the dorsal tubercles are numerous and free from serrations; the shorter branch is a mere tooth, about one-fourth of the length of the longer, which has a gentle curvature inwards

These increase in length ventrally; the outer setæ, *i.e.*, those nearer the dorsal surface—being very short. The ventral setæ, which are fairly numerous, are of two kinds; those of the one kind, of various lengths, are smooth and bifurcated; the shorter branch being well developed, of about one-third the length of the longer, which has a strong bend outwards, and terminates in a blunt apex. The others are fewer, and of a very unusual shape. They have a slender stalk of varying length, but always much shorter than the longest of the other variety, and divided by a longitudinal dark line. This stalk bifurcates, the branches being much stouter than the stem, and of somewhat complex form. The shorter branch is somewhat club-shaped, and curved slightly outwards to a blunt apex; the longer branch is narrower than the other at its base, but expands into an extremity with somewhat the form of a bird's head—the “beak” being turned outwards; the narrower stalk of this branch—representing the neck of the bird—follows the curvature of the smaller branch; and both the apposed borders are lined with a series of small serrations.

Hab. Darnley Island. (Chevert Exped.)

ESSAY ON THE ICHTHYOLOGY OF PORT JACKSON.

By COUNT F. DE CASTELNAU.

My intention is to give in this paper a list of all the species of bony fishes (*teleostei*) that have up to this day been observed in the great Harbour of Port Jackson and in its immediate vicinity.

I know that this catalogue will be found very incomplete; it must only be considered as giving, as far as possible, the list of the sorts that have been quoted by authors as having been found at Sydney, and of all those I have, during a stay of nearly two years, been able to collect by daily visits to the fishmongers. Of those I have seen in a fresh state, I give a particular notice and a description of their colours, &c; this having generally been omitted by travellers; and most being only known from discoloured specimens in European Museums.

The study of Ichthyology is attended with much more difficulty than that of any other branch of zoology; not only are the species very numerous and often very difficult to distinguish one from the other, but they also present difficulties from their size and mode of preservation; a small box may contain a large number of insects; and it is the same with shells, and to a certain degree, with bird skins; fishes, on the contrary, are generally preserved in liquor; the vases that contain them are large, bulky, easily broken, and very difficult to transport. The rules of most of the Australian Museums do not allow specimens to be removed from their buildings; and whatever may be the kindness of the curators, they cannot break these rules. On the other hand, numerous books are required for the study of fishes; and those are not generally found in the scientific establishments of this country. These reasons explain why certain species from Sydney contained in the Australian Museum are not included or described in this paper.

The Brisbane and Adelaide Museums have adopted a different system, and have sent me all their fishes, and thus their Ichthyological collections, &c., are completely named, while those of the other museums are the very reverse.

Mr. W. Macleay owns a splendid collection of Australian zoology, and has most liberally lent me specimens and valuable books. I am also indebted to him for several rectifications in the names of the species.

Mr. Ramsay, of the Australian Museum, has also done all in his power to assist me by lending me any of his own books I had not in my own library.

The species here mentioned as inhabiting Port Jackson, number two hundred and nineteen, of which one hundred and thirty have, till now, only been found in Australian waters, and eighty-six extend their habitat to other seas.

Of about one hundred and fifty sorts that have, to my knowledge, been observed in Hobson's Bay and its vicinity, only thirty-seven are included amongst those found at Sydney. This is a curious fact as these two localities are so near one another. If we examine the localities of the sorts found in other regions,

we find that by far the greatest part are from the Indian and Polynesian seas, and that some of these enter the Red Sea, that eight or nine extend to Japan, and nine or ten to New Zealand, seventeen to the Atlantic Ocean, and seven or eight to the European seas, most of them to the Mediterranean. It must, however, be recollected that at least three of these are doubtful, and will require numerous specimens to be closely compared.

The fish market of Sydney presents two different aspects; in winter, it contains only a very few sorts, of dark colour, and almost all the same as those found in the Melbourne sea, and exclusively Australian. In the warm months of the year appear the *denizens* of the Indian and Pacific oceans, adorned with all the splendid hues that nature seems so apt to lavish on the tropical sorts.

BERYCIDE.

Trachichthys Australis, *Shaw*.

Beryx affinis, *Gunth.* *Nanegai*.

??? *Monocentris Japonicus*, *Houthuyn*.

PERCIDE.

Lates colonorum, *Gunth.* *Perch*.

Enoplosus armatus, *White.* *Old Wife*.

Serranus Damelii, *Gunth.* *Rock cod*.

dispar, *Steind.* *id.*

Merra, *Bloch*, *id.*

guttatus, *C. V.* *id.*

guttulatus, *Macleay.* *id.*

undulato-striatus, *Peters.* *id.*

Neocanthias Guntheri, *Oast*.

Plectropoma serratum, *C. V.*

annulatum, *Gunth.*

semicinctum, *C. V.*

cyanostigma, *Gunth.*

nigro-rubrum, *C. V.*

Priacanthus macracanthus, *C. V.*

Benmebari, *Schleg.*

Diacopus Bengalensis, *Bloch.*

Apogon fasciatus, *White*.

Novæ-Hollandiæ, *Val.*

Arripis truttaceus, *C. V.*

Glaucosoma Burgeri, *Rich.*

PRISTIPOMATIDÆ.

Therapon Cuvieri, *Bleek.*

servus, *Bloch.*

Helotes sexlineatus, *Quoy. & Gaim.*

Agenor modestus, *Oast. sp. nov.*

MULLIDÆ.

Upeneichthys porosus, *C. V. Pink cheek.*

Upenoides Vlamingii, *C. V. Red Mullet.*

Upeneus signatus, *Gunth.*

SPARIDÆ.

Malanichthys tri-cuspidata, *Q. & Gaim. Black Fish.*

simplex, *Richard.*

zonata, *Gunth.*

Lethrinus gliphodon, *Gunth.*

chrysostomus, *Rich.*

Pagrus unicolor, *Q. & Gaim. Schnapper.*

Chrysophrys Australis, *Gunth. Bream.*

Sarba, *Forst. Black bream.*

Aphareus roseus, *Oast. Sp. nov.*

Aplodactylus obscurus, *Oast. Sp. nov.*

lophodon, *Gunth.*

SQUAMIPINNES.

Atypichthys strigatus, *Gunth.*

Chætodon sexfasciatus, *Rich.*

Neochætodon vittatus, *Oast.*

Scatophagus multifasciatus, *Rich.*

Argus, *Linn.*

Scorpiæ equipinnis, *Rich. Sweep.*

CIRRHITIDÆ.

Chironemus marmoratus *Gunth.*

Cheilodactylus fuscus, *Oast. Sp. nov.*

- Cheilodactylus gibbosus*, Rich.
 annularis, Cast. *Sp. nov.*
Zeodrius vestitus, Cast. *Sp. nov.*
Latris ciliaris, Forst.

TRIGLIDÆ.

- Scorpsæna cardinalis*, Rich. *Red Rock cod.*
 cruenta, Soland. *Id.*
 bynoensis, Rich. *Id.*
Sebastes percoides, Rich. *Id.*
Phatyccephalus fuscus, O.V. *Flat-head.*
 lævigatus, O.V. *Id.*
 bassensis, O.V. *Id.*
 cirronasus, Gunth. *Id.*
Centropogon robustus, Gunth.
 Australis, White.
Pentaroqe marmorata, O.V. *Fortescue.*
Trigla Kumu, Garnot. *Gurnet.*
 pleuracanthica, Rich. *Id.*
 polyommata, Rich. *Flying gurnet.*
Lepidotrigla Papilio, O.V.
Dactylopterus orientalis, O.V.
Synancidium horridum, Linn.
Pterois zebra, O.V.
 volitans Linn.

TRACHINIDÆ.

- Percis nebulosa*, O. V.
 maculata, Q. & Gaim. *Whiting.*
Sillago { *Bassensis*, Cuv. V. *id.*
 { *Terræ-Reginæ*, Cast. *olim.*
Leptoscopus macropygus, Rich.
Aphritis Urvillei, C.V.*

SCLENIDÆ.

- Scisæna* { *Aquila*? Lacep. *Jew fish.*
 { *Antarctica*, Cast. *olim.*

POLYNEMIDÆ.

- POLYNEMUS Indicus*, Shaw.

* The specimens from China belong probably to a different sort.

Polynemus macrochir, *Gunth.*

SPHYRÆNIDÆ.

Sphyræna Novæ-Hollandiæ, *Gunth.* *Pike.*

Neosphyræna multiradiata, *Cast.*

SCOMBRIDÆ.

Zeus { *Faber ? Linn.* *John Dorey.*
 Anstralis, Rich.

Scomber Antarcticus, *Cast.* *Mackerel.*

Elacate nigra, *Bloch.* *King Fish.*

Naucrates ductor, *Bloch.* *Pilot fish.*

Echeneis naucrates, *Linn.*

remora, *Linn.*

Auxis Ramseyi, *Cast. nov. sp.* *Horse mackerel.*

Cybium Commersonii, *Lacep.* *Id.*

Thynnus Pelamys, *Linn.* *Id.*

Brama Raii, *Bloch.*

CARANGIDÆ.

Seriola Lalandii, *O.V.*

hippos, *Gunth.*

grandis, *Cast.*

nigrofasciatus, *Ruppel.*

Trachurus { *declivis*, *Jenyns.*
 Trachurus ? Bellon.*

Trachinotus ovatus, *Linn.*

Bailloni, *Lacep.*

Blepharis ciliaris, *Bloch.*

Pempheris compressus, *White.*

Temnodon Saltator, *Linn.* *Taylor.*

Caranx georgianus, *O.V.* *White Trevally.*

macrosoma, *Bleek.* *Yellow-tail.*

Psenes leucurus, *O.V.*

Psettus argenteus, *Lacep.*

XIPHIDÆ.

Histiophorus gladius, *Linn.*

* If, after careful comparison of a large number of specimens, it was proved that this is really *Trachurus*, then it would be found nearly all over the world.

GOBULÆ.

- Eleotris Australis*, *Gunth.*
mogurnda, *Rich.*

BATRACHIDÆ.

- Batrachus dubius*, *White.*

PEDICULATI.

- Antennarius pinniceps*, *O. V.*
Commersonii, *O. V.*

BLENNIDÆ.

- Cristiceps antinectes*, *Gunth.*
 aurantiacus, *Oast. Sp. nov.*
 Macleayi, *Oast. Sp. nov.*
Pataecus { *fronto*, *Rich.*
 maculatus, *Gunth.*
Petroscirtes variabilis, *Cantor.*
 analis, *O. V.*
Sticharium dorsale, *Gunth.*
Blennius unicornis, *Oast. Sp. nov.*

TEUTHIDÆ.

- Teuthys Javus*, *Linn.*
 nebulosa, *Q. & Gaim.*

NANDIDÆ.

- Ruppelia prolongata*, *Oast. Blue-fish.*
Trachinops tæniatus, *Gunth.*

ATHERINIDÆ.

- Atherina pinguis*, *Lacep. Hardy Head.*
Atherinichthys Jacksoniana, *Q. & Gaim.*

MUGILIDÆ.

- Mugil dobula*, *Gunth. Hard-gut mullet.*
 Peronii, *O. V. Fan-tail mullet.*
 grandis, *Oast. N. sp.*
Myxus elongatus, *Gunth.*

FISTULARIDÆ.

- Fistularia, serrata*, *Ouv.*

POMACENTRIDÆ.

- Heliastes hipsilepis*, *Gunth.*
Pomacentrus unifasciatus, *Gunth.*
Parma microlepis, *Gunth.*
squamipinnis, *Gunth.*

LABRIDÆ.

- Trochocopus unicolor*, *Gunth.*
Labrichthys gymnogenis, *Gunth.* *Parrot-fish.*
Parila, *Rich.* *id.*
luculentus, *Rich.* *id.*
nigro-marginatus, *M. L.* *id.*
laticlavus, *Rich.* *id.*
Cossyphus unimaculatus, *Gunth.* *Pigfish.*
vulpinus, *Rich.*
Gouldii, *Rich.* *Blue groper.*
Coris lineolata, *C. V.* *Parrot-fish.*
Odax semifasciatus, *C. V.* *id.*
balteatus, *C. V.* *id.*
obscurus, *Oast.* *id.*
Olistherops { *cyanomelas*, *Rich.*
 { *brunneus*?* *Macleay.*
Heteroscarus Castelnani, *Macleay.*

GERRIDÆ.

- Gerres ovatus*, *Gunth.*
subfasciatus, *C. V.*

GADIDÆ.

- Lotella callarias*, *Gunth.*
rubiginosa, *Gunth.*

PLEURONECTIDÆ.

- Rhombosolea flesoides*, *Gunth.* *Sole.*
Pseudorhombus Russelii, *Gray.* *Flounder.*
Synaptura quagga, *Kaup.*

* I consider Mr. Macleay's sort as only a variety, because out of the large number of specimens I have seen at Melbourne I have found the greatest variations, not only in colour but also in form. Some specimens are much more convex than others, some have the external rays of the caudal fin elongated, some are black, some are spotted with blue, some are of a reddish-brown, with or without spots,

Pardachirus pavoninus, *Lacep.*

Ammotretus rostratus, *Gunth.*

Solea microcephala. *Gunth.*

SILURIDÆ.

Onidoglanis Megastoma, *Rich.* *Cat-fish.*

lepturus ? *Gunth.* *Dog-fish.*

SCOPELIDÆ.

Saurida nebulosa, *C.V.*

Australis, *Oast.* *N. sp.*

undosquamis, *Rich.*

Saurus Myops, *Bloch.*

Aulopus purpurissatus, *Rich.* *Sargeant Baker.*

SCOMBRESOCIDÆ.

Hemirhamphus regularis, *Gunth.* *Gar-fish.*

melanoichir, *C.V.* *id.*

{ *argenteus*, *Bennet.*

{ *breviceps*, *Oast. olim.*

Belone ferox, *Gunth.* *Long Tom.*

CLUPEIDÆ.

Elops saurus, *Linn.*

Chanos salmoneus, *Bloch.*

Clupea Moluccensis ? *Bloch.* *Sprat.*

Sagax, *Jenyns.* *id.*

hypselosoma. *id.*

Etrumeus Jacksoniensis, *Macleay.*

MURÆNIDÆ.

Ophichthys Serpens, *Linn.*

Murænesox Bagio, *Kaup.* *Sea El.*

Myrophis Australis, *Oast. N. sp.* *id.*

Muræna silurea, *Richard.* *id.*

afra, *Bloch.* *id.*

Conger ? *labiata*, *Oast. N. sp.* *id.*

Anguilla Australis, *Rich.* *El.*

SYNGNATHIDÆ.

Stigmatophora Argus, *Rich.*

nigra, *Kaup.*

- Syngnathus tigris*, *Cast.* *N. sp.*
margaritifer, *Peters.*
Phyllopteryx foliatus, *Shaw.* *Sea-horse.*
Hippocampus Novæ-Hollandiæ, *Steind.* *id.*
tristis. *Casteln.*

SCLERODERMES.

- Balistes Jacksonianus*, *Q. & Gaim.* *Leather-jacket.*
Monacanthus Ayraudi, *Q. & Gaim.* *id.*
convexirostris, *Gunth.* *id.*
granulatus, *White.* *id.*
megalurus, *Rich.* *id.*
tomentosus, *Linn.* *id.*
Peronii, *Hollard.* *id.*
penicilligerus, *Cuvier.* *id.*
hippocrepis, *Q. & Gaim.* *id.*
platifrons, *Hollard.* *id.*
maculosus, *Rich.* *id.*
rudis, *Rich.* *id.*
spilomelanurus, *Q. & Gaim.* *id.*
prasinus, *Cast.* *id.*
{ obscurus, Cast (1). *id.*
{ brunneus, Cast. olim.
{ Damelii, Gunth.

OSTRACIONTINA.

- Ostracion diaphanus*, *Bloch.* *Coffin-fish.*
concatinatus, *Bloch.* *id.*
Aracana lenticularis, *Rich.* *id.*

GYMNODONTES.

- Tetrodon immaculatus*, *Block.* *Toad-fish.*
hispidus, *Bl.* *id.*
lunaris, *Bl.* *id.*
Hamiltoni, *Rich.* *id.*
amabilis, *Cast.* *Sp. nov.* *id.*

(1) I had described this sort under the name of *Brunneus* (Proceed. Zool. Soc. of Victoria, 1873, p. 145); but having myself, by mistake, given the same name to an other sort, I changed it to the present one (Researches on the Fishes of Australia, Feb., 1876, p. 51.) included in the Victorian Exhibition Papers for 1876. In the same year, May, 1876, Dr. Gunther proposed for the same sort the name of *Damelii*. (Annals Mag. of Natural History.)

- Tetrodon hypselogenion*, *Gunth.* *id.*
 firmamentum, *Schleg.* *id.*
 lævigatus, *Linn.* *id.*
Diodon novemmaculatus, *Cuv.* *Sea-hog or globe.*
 Hystrix, *Linn.* *id.*
Dicotylichthys punctulatus, *Kaup.*

The following sorts appear to be confined to Australian waters :—

- Trachichthys Australis.*
Lates colonorum.
Enoplosus armatus.
Serranus Damelii.
 guttulatus.
Plectropoma serratum.
 annulatum.
 nigrorubrum.
Apogon fasciatus.
 Novæ-Hollandiæ.
Arripis truttaceus.
Glaucoosoma Burgeri.
Helotes sexlineatus.
Agenor modestus.
Upeneus signatus.
Melanichthys tricuspidata.
 simplex.
 zonata.
Pagrus unicolor.
Lethrinus chrysostomus.
Chrysophrys Australis.
Aplodactylus obscurus.
 lophodon.
Chætodon sexfasciatus.
Neochætodon vittatus.
Scatophagus multifasciatus.
Scorpiæ æquipinnis.
Chironemus marmoratus.
Cheilodactylus fuscus.

- Cheilodactylus gibbosus.*
 annularia.
Zeodrius vestitus.
Scorpeæna cardinalia.
 bynoensis.
Platycephalus lævigatus.
 bassensis.
 cirronasus.
Centropogon robustus.
 Australis.
Trigla pleuracanthica.
Trigla polyommata.
Percis nebulosa.
Sillago maculata.
 bassensis.
Leptoscopus macropygus.
*Aphritis Urvillei.**
Polynemus macrochir.
Sphyræna Novæ-Hollandiæ.
Neosphyræna multiradiata.
Scomber antarcticus.
Auxis Ramseyi.
Seriola hippos.
 grandis.
Trachurus declivis ??
Pempheris compressus.
Caranx georgianus.
Eleotris Australis.
 mogurnda.
Batrachus dubius.
Oristiceps antinectes.
 Macleayi.
 aurantiacus.
Blennius unicornis.
Pateucus fronto.

* The specimens from China are most probably of a different sort.

Petroscirtes analis.
Sticharium dorsale.
Ruppelia prolongata.
Trachinops tæniatus.
Atherinichthys Jacksoniana.
Mugil Peronii.
 grandis.
Myxus elongatus.
Heliastes hipsilepis.
Pomacentrus unifasciatus.
Parma microlepis.
 sqamipinnis.
Trochocopus unicolor.
Labrichthys gymnogenis.
 Parila
 luculenta.
 nigromarginata.
 laticlavus.
Cossyphus unimaculatus.
 vulpinus.
Coris lineolata.
Odax balteatus.
 obscurus.
Olisthrops cyanomelas.
Heteroscarus Castelnau.
Gerres ovatus.
 subfasciatus.
Lotella callarias.
 rubiginosa.
Rhombosolea flesoides.
Pseudorhombus Russellii.
Ammotretus rostratus.
Solea microcephala.
Cnidoglanis megastoma.
 lepturus.
Saurida Australis.
 undosquamis.

Aulopus purpurissatus
Hemirhamphus regularis.
argenteus.

Belone ferox.

Olupea hypselosoma.

Etrumeus Jacksoniensis.

Myrophis Australis.

Muraena silurea.

Conger ? *labiata*.

Anguilla Australis.

Stigmatophora nigra.

Syngnathus tigris.

margaritifer.

Phyllopteryx foliatus.

Hippocampus Novæ-Hollandiæ.

Balistes Jacksonianus.

Monacanthus Ayrandi.

convexirostris.

granulatus.

megalurus.

Peronii.

hippocrepis.

platifrons.

maculosus.

rudis.

spilomelanurus.

prasinus.

obscurus.

Aracana lenticularis.

Tetrodon amabilis.

The species that are also found in other seas than the Australian are :—

??? *Monocentris japonicus*. *Japan*.

Beryx affinis. *N. Zeal*.

Serranus dispar. *Indian Sea*.

Merra. *Id.*

guttatus. *Ind. Sea, Polynesia*.

- Serranus undulato-striatus.* *Ind.*
Neanthias Guntheri. *Moluccas.*
Plectropoma semicinctum. *Ohili.*
 cyanostigma. *Moluccas.*
Priacanthus macracanthus. *Id. Japan.*
 benmebari. *Japan.*
Diacopus bengalensis. *Ind. Polynesia.*
Therapon cuvieri. *Moluccas*
 servus. *India.*
Upeneichthys porosus. *N. Zealand.*
Upeneoides Vlamingii. *N. Zeal. Moluccas.*
Lethrinus glyphodon. *Louisiad.*
Chrysophrys sarba. *Red & Ind. Sea.*
Aphareus roseus. *Moluccas.*
Atypichthys strigatus. *N. Hebrides.*
Scatophagus argus. *India.*
Latris ciliaris. *N. Zealand.*
Scorpena cruenta. *Id.*
Sebastes percooides. *Id.*
Platycephalus fuscus. *Pacific.*
Pentarogeton marmorata. *Timor.*
Trigla kumu. *N. Zeal.*
Lepidotrigla papilio. *Indian.*
Dactyloptera orientalis. *Indian Sea.*
Synancidium horridum. *Ind.*
Pterois zebra. *Ind.*
Pterois volitans. *Ind.*
Sciaenops aquila. *Atlantic, Medit., Cape G. Hope.*
Polynemus indicus. *Ind. Sea.*
Zeus faber? *Medit. Atlant.*
Elacate nigra. *Antilles, Ind., Japan.*
Naucratis ductor. *Europe, N. Amer., Madeira, C.G.H.*
Echeneis naucrates. *N. & S. Amer., Madeira, Ind., China.*
 Remora. *Europe, Madeira, C. G. H., Ind., China.*
Cybbium Commersonii. *Ind.*
Thynnus pelamys. *Atlant., Ind.*
Brama raii. *Atlant., Medit., C.G.H.?*

- Seriola Lalandii.* *S. Amer., Japan, O. G. H. ?*
nigro-fasciata. *Red & Indian Seas.*
Trachinotus ovatus. *Atlant. Ind.*
Bailloni. *Ind.*
Blepharis ciliaris. *Red & Ind. Seas.*
Temnodon Saltator. *N. & S. Amer., Ind.*
Caranx macrosoma. *Moluccas.*
Psenes leucurus. *Ind.*
Psettus argenteus. *Red & Ind. Seas, Polynesia.*
Antennarius pinniceps. *Ind.*
Commersonii. *Ind., Moluc.*
Histiophorus gladius. *Europe, Atlant.*
Petroscirtes variabilis. *Ind.*
Teuthys Javus. *Ind.*
nebulosa. *Polynesia.*
Atherina pinguis. *Ind., Polynesia.*
Mugil dobula. *Polynes.*
Fistularia serrata. *Ind. China.*
Odax samifasciatus. *Ind. ?*
Synaptura quagga. *China.*
Pardachirus Pavoninus. *Ind.*
Saurida nebulosa. *Ind., Polyn.*
Saurus myops. *Antilles, Ind., Polyn.*
Hemirhamphus melanochir. *Ch. N. Zeal.*
Elops Saurus. *Antilles, S. Amer., Ind. & Red Seas.*
Chanos salmoneus. *Red, Ind., China & Pacific Seas.*
Clupea moluccensis. *Ind., Moluc.*
sagax. *Japan, Amer. Pacific, N. Z.*
Ophichthys serpens. *Medit., Atlant., Japan.*
Murcenesox Bagio. *Ind., Japan.*
Murcena afra. *Atlant., Antilles, Ind.*
Stigmatophora argus. *N. Guinea.*
Monacanthus tomentosus. *Ind., China.*
penicilligerus. *Ind.*
Ostracion diaphanus. *Japan, O. G. Hope.*
concatinatus. *China, C. G. Hope.*
Tetrodon lunaris. *Atlant. Pacific, Moluccas.*

Tetrodon immaculatus. *Red, Ind, & Polynesian Seas.*

hispidus. *Red, Indian Seas.*

hypselogenion. *Ind. Polynes.*

firmamentum. *Japan.*

lœvigatus. *Atlant (Brasil).*

Diodon novemmaculatus. *Atlant., Pacific, Ind.*

hystrix. *Id. Id. Id.*

Dioclylichthys punctulatus. *South Indian Sea.*

Of about one hundred and fifty sorts known as inhabiting Hobson's Bay and its immediate vicinity, the following thirty-six only are, to my knowledge, found in Port Jackson. This number will, of course, be modified, but I consider it as very remarkable between two localities only six hundred miles apart:—

*Lates Colonorum.**

Enoplosus armatus.

Arripis truttaceus.

Upeneichthys porosus.

Upeneus Vlamingii.

Melanichthys tricuspidata.

simplex.

zonata.

Pagrus unicolor.

Chrysophrys Australis.

Chironemus marmoratus.

Cheilodactylus gibbosus.

Sebastes percoides.

Platycephalus fuscus.

bassensis.

laevigatus.

Trigla polyommata.

Sillago maculata.

Sphyræna Novæ-Hollandiæ.

Neosphyræna multiradiata.

Sciæna Aquila?

* Not found at Melbourne, but brought there in great numbers from the Gippeland Lakes.

Scomber antarcticus.
Zeus faber ?
Seriola grandis.
Caranx georgianus.
Temnodon Saltator.
Mugil grandis.
Olistherops cyanomelas.
Anlopus purpurissatus.
Hemirhamphus melanochir.
Anguilla Australis.
Hippocampus tristis.
Phyllopteryx foliatus.
Monacanthus Peronii.
 prasinus.
Tetrodon hispidus.

TRACHICHTHYS AUSTRALIS.

Trachichthys Australis, Shaw ; Nat. Miscel., pl. 376.

Scales, rough ; those of the lateral line not larger ; the serrated ventral keel composed of ten scales ; the height of the body contained once and four-fifths in total length, without the caudal fin ; upper profile, convex ; the fish almost round until the end of the dorsal and anal fins ; a very strong and serrated spine on the scapular bone ; head contained twice and three-fourths in the total length to the base of the caudal ; eye, very large, contained a little over twice in the length of the head ; scales, strongly ciliated ; a strong flat spine at the angle of the opercle ; mouth, rather extensible ; teeth, villiform, none on the palate ; lower jaw longer than the upper one ; the snout is one-third the length of the diameter of the orbit ; two bony ridges run from the orbit to the edge of the præopercle ; this is finely denticulated on its lower part ; the lateral line is elevated on its posterior half ; the upper dorsal is formed of four spines and twelve rays ; the first of these rays is simple ; the caudal is very strongly forked ; the anal has two spines and ten rays—the first of these equally simple ; the ventrals have one spine and six rays, the first of which is simple and serrated except at its extremity.

Entirely of a reddish brown ; caudal black, with a broad white border all round ; dorsal and anal dark, with the base and the anterior part white ; pectorals and ventrals reddish, with the spine of the last white.

One single specimen seen on the 19th of September, 1877. It is five and a half inches long.

BERYX AFFINIS.

Beryx Affinis, Gunther ; Catal., vol. I., p. 13.

Cast. ; Proceed. Linn. Soc. of N.S.W., vol. II., p. 225.

This fish, known as the *Nanegai*, is more particularly found in the warm season, but it sometimes appears in May, July, and August. It is at times very numerous ; and by its splendid pink colour attracts notice amongst the generally dark coloured fish exposed in the Australian markets.

MONOCENTRIS JAPONICUS.

Monocentris Japonicus, Houttuyn ; Act. Harbm., XX., p. 329.

A fine specimen of this sort, preserved in liquor, and given by M. Fitzhardinge, is in the Sydney Museum, and is said to have been found at Port Jackson. No other specimen has ever been seen ; and if this is really Australian, it must have been driven from Japan by one of Nature's great convulsions, and even then it could not be considered as inhabiting the Australian coast.

I only mention it here because Mr. Gerard Krefft includes it in his list of Australian fishes. (Industrial Progress of New South Wales, 1871.)

LATES COLONORUM.

Lates Colonomum, Gunther ; Ann. Nat. History, 1863, vol. XI., p. 114.

Cast. ; Proceed. Zool. Soc. Victor. vol. I., p. 43.

Called in Sydney *Perch* ; is found in great quantities in the swamps near Newcastle ; is commonly brought to the Sydney market in June and July. It is also found in the Gippsland Lakes.

SERRANUS DAMELII.

Serranus Damelii ; Gunther's Ann. and Magas. Nat. Hist., vol. XVII., p. 391 ; 4th Series, 1876.

Black Rock Cod.

Entirely of a purplish black ; generally a black spot on the

base of the tail at the end of the soft dorsal; extremity of the caudal black, with a white fringe. In some specimens, when fresh, there are faint traces of blue spots; body, elongate; its height about three times in the total length, without the caudal; head contained twice and a half in the same; canine teeth, very strong; preopercle, very finely serrated behind; the central spine of the opercle strong; body scales very small; dorsal formed of eleven spines—the two first lower than the third, the others becoming rather shorter as they extend backwards; the soft part rather higher than the spines, of fourteen rays; caudal rounded; anal with three spines, of which the first is shorter, and the others almost equal.

This sort attains two feet in length, and is esteemed for the table.

SERRANUS UNDULATO-STRIATUS.

Serranus undulato-striatus, Peters, Monatsber, Ak. Wiss. Berlin, 1866, p. 518.

Body compressed, high, with the head rather pointed; the greatest height of the body contained twice and a half in the total length without the caudal fin; head contained less than twice and a half in the same; body covered with moderate scales; those on the cheeks and opercles much smaller; the præopercle finely denticulated on its posterior edge, with two or three much larger spines at the angles; dorsal fin with eleven spines and fifteen rays; the third spine is the longest; caudal rounded; anal with three spines and seven rays; the second spine the strongest. Entirely of a very light creamy brown; all over the body numerous, rather narrow, more or less oblique stripes of a reddish brown; soft dorsal and anal, and also the caudal fin bordered with very bright yellow; the other part of the fins rather dark; pectorals yellow.

The specimen is eleven inches long.

NEOANTHIAS.

Seven branchiostegals; teeth villiform, without canines in either jaw, but with an outer line of larger ones in front; teeth on the palatine bones and on the tongue; one dorsal fin with ten spines; anal fin with three; opercule with two flat spines; præo-

percle finely and equally serrated, but no spines on the lower limbs; scales large; no denticulations on the præorbital; some of the pectoral rays elongate.

NEOANTHIAS GUNTHERI.

Body oval, compressed; its height contained about twice and three-quarters in the total length, without the caudal fin, or nearly three times including this; head, three times and one-third in the same length; eye large, contained about four times and-a-half in the length of the head; this is entirely covered with scales much smaller than those of the body; the lower jaw rather longer than the upper; when the mouth is closed, the maxillary reaches the centre of the orbit; the scales of the anterior part of the back similar; lateral line continuous, but not extending on the caudal fin; about seventy-five scales on the lateral line; dorsal with ten very strong spines, of which the first is the shortest and the fifth the longest; the soft part is equal in height to the other, and formed of twenty-one rays; the caudal is large, strongly emarginated with two rather elongated and pointed lobes, which are equal to about one-half the length of the fin; anal with three strong spines, of which the first is rather short and the two others nearly equal and more than twice as long; and only twice and two-thirds in the total length without the caudal; the soft part has eight rays; ventrals, large; pectorals very large, scaly at the base, of nineteen rays, of which the 8th, 9th, 10th, 11th, and 12th are nearly simple, being only divided over their extremity; these are much longer than the others, and the eleventh is remarkably so, and extends considerably further than its membranes; this pectoral fin reaches to the vertical from the origin of the anal; its length is equal to the height of the body; the teeth are very numerous, particularly disposed in two bunches in front; there is an external line of rather larger ones, but no true canines; on the lower jaw, there are on each side, in front, three or four larger ones, conical and directed forwards; the palatine teeth form three large patches; the opercle has a very strong upper spine, and a much weaker lower one; this is flat and is denticulated on its edge.

The colour is of the most magnificent pink, with numerous

irregular and very little defined yellow stripes, running obliquely on the back; an oblique stripe of that colour on the opercle, below the eye, and others on the front of the head; on the back part of the back there are dark transverse lines, very irregular and not defined; the dorsal is of a beautiful yellow, with the rays pink; a large black blotch covers the two anterior thirds of the soft part, which is edged with pink; the caudal is yellow; the anal is pink, with each membrane having two or three rounded spots of a fine yellow; ventrals and pectorals yellow, with the rays pink; the membranes of the fins are covered with small scales nearly the entire length. It must be very near to *Anthias longimanus* of Gunther, but some of the proportions are different. The present fish seems to be more elongate; the lobes of the caudal and the pectorals shorter; the scales less numerous.

This beautiful fish was caught on the 19th of July, 1878, and is a little over eighteen inches long.

PLECTROPOMA SERRATUM.

Plectropoma serratum; Cuv. Val., vol. I., p. 399.

Quoy and Gaim; *Astrolabe Fish*, pl. 2, p. 1.

Body very high, short; its height twice and-a-half in the total length, without the caudal fin, or twice and four-fifths with the latter; the head is more than one-third of the total length; the eye is contained five and-a-half times in the head; there is a series of very large outer teeth, but no real canines; præopercle with strong teeth behind, becoming still stronger at the angle, with two very strong spines on the lower edge; these are about equal; the opercle has three spines; the first dorsal has thirteen strong spines—the 3rd, 4th, 5th, and 6th are the longest; the soft part has fifteen rays, and is as high as the longest part of the spiny portion; caudal fin, rounded; the anal has three spines, the central one the longest, and eight rays.

The fish is entirely of an olive yellowish green, covered with small rounded blue spots each covering four scales; the fins similarly spotted, with the exception of the ventrals and pectorals, which are dark green; length, thirteen inches.

I have very little doubt that this is the sort described by

Cuvier from King George's Sound. It comes very near to *cyanostigma*, but the body seems to be much shorter and higher, and the opercular teeth different. By its colouration, it resembles also *Plectropoma maculatum*, Bloch; very handsomely figured by Dr. Gunther in the Jour. Mus. Godeffroy, but differs equally by its high body, the form of the caudal, &c.

PLECTROPOMA ANNULATUM.

Plectropoma annulatum; Gunther's Catal., vol. I., p. 158.

Body short; præopercle serrated behind; having a flat serrated spine at the angle and two small ones below; opercle serrated below, with two strong spines near its angle; caudal fin rounded; dorsal, with its two portions so deeply divided as to almost have the appearance of two fins; it is formed of ten spines, of which the fourth and fifth are the longest, and of eighteen rays; the anal has three spines and seven rays.

The general colour is of a handsome light brown, with six broad transverse black bands, of which two are placed on the tail; there is a longitudinal black stripe in front of the head, and three others on the upper part of the head, running obliquely—two from the back to the eye, and one on the opercle; those of the back extend on the dorsal fin.

The dorsal and caudal are of the colour of the body, and the other fins are of a beautiful crimson. The specimen is a little under nine inches long.

This sort is nearly allied but very distinct, from *Plectropoma nigro-rubrum* of the Western Coast, which it seems to represent on the Eastern one. Dr. Gunther has very well described this fish, but did not know its habitat.

PRIACANTHUS MACRACANTHUS.

Priacanthus macracanthus; Cuv. Val., vol. III., p. 108.

Bleekeri, Cast; Proceed. Zool. Soc. Victoria, vol. II., p. 100.

The height of the body is contained three times and-a-half in the total length, without the caudal fin; head three times and one-third in the same; diameter of the eye more than one-third the length of the head; the angle of the præopercle having a

very long flat serrated spine ; opercle rather feebly emarginated ; caudal fin strongly emarginate ; the spines of the fins slender, with a striated surface ; ventrals large, nearly as long as the head (upper jaw) ; the third spine of the anal the longest ; mouth extensible.

Of a light silvery grey, washed with pink ; head of the last colour ; belly, silvery ; fins of a reddish pink ; the back part of the dorsal, the anal, and ventrals having two rounded dark spots on each membrane ; the ventrals red ; the end of the caudal rather dark.

Obtained several times in May at Port Jackson. Length of specimens eight to twelve inches.

APOGON FASCIATUS.

Mullus fasciatus, White ; Voy. N.S. Wales, p. 268, f. 1.

This pretty little fish appears sometimes in the Sydney market, principally in March. It has seven spines in its first dorsal, but the first is so short as to be easily overlooked ; the third spine is the longest ; the height of the body is contained three times in the total length of the fish ; the eye is less than three times in the length of the head.

The colour is of a handsome light lilac, with three longitudinal black brown streaks—one at the base of the dorsal, and the others on the sides of the body ; below this, there is another very faint one ; the lower parts of the body are reddish, and the fins are scarlet, with a black stripe at the base of the second dorsal and at the anal ; on the caudal, the central black band extends on all its length ; and its edges and extremities are also black.

This is certainly the *Mullus fasciatus* of White ; but it is doubtful if the different synonymes quoted by Dr. Gunther do apply to the same sort ; *novem fasciatus*, and other Indian species seem to me to be different ; otherwise, Dr. Gunther's figures (Mus. Godeffroy, pl. 20, fig. A. and B.) would be very incorrect. The Australian fish has the body higher, the eye a great deal larger, the snout more advanced, the opening of the mouth more oblique, and the colours very different.

AGENOR.

Teeth villiform on both jaws with a series of sharp conical pointed teeth on the vomer and palatines; no molars; cheeks and opercles scaly; vertical fins in great part covered with scales; dorsal fin not notched; of ten spines; scales rather small, body high, compressed.

This new genus belongs to the *Pristipomatidæ*.

AGENOR MODESTUS.

The height of the body is contained once and three-fourths in the total length, without the caudal fin; the head is three times and-a-half in the same; and the diameter of the eye twice and one-fourth in the length of the head; the snout is not more than one-half the diameter of the eye; the lower jaw is a little longer than the upper one; the maxillary extends to the perpendicular from the anterior quarter of the eye; the præorbital is finely serrated; the head is entirely covered with scales except on the snout; the præopercle is finely serrated; there is a feeble spine on the opercle; lateral line continued on the base of the caudal fin; the first dorsal spine is very small, the others gradually increasing in length, the soft portion in a scaly sheath, formed of twenty-six rays; the caudal long, bifid, not complete in my specimen; the anal with three spines and twenty-six rays; the ventrals placed very near one another; the body very compressed.

The fish is of a dark silvery colour, with the upper parts nearly black; the fins dark; the pectorals rather yellow.

The specimen is nearly four inches long.

UPENEICHTHYS POROSUS.

Upeneichthys porosus; Cuv. Val., vol. III., p. 455.

Also found at Melbourne; known at Sydney under the name of Pinkcheek.

Entirely of a fine flesh orange colour; streaks on the sides of the head, orange; a longitudinal dark stripe on the sides following the line of the back; end of the barbels and pectorals of a fine sulphur colour.

Not common; February and May.

UPENOIDES FLAMINGII.

Upenoides Flamingii; Cuv. Val., vol. III., pl. 71.

Already observed at Melbourne. This sort seems to be subject to much variety in colour.

The specimens seen at Sydney were of a dark brown or scarlet on the back; each body scale had a small round spot of a fine light blue; some lines of this last colour extend in an oblique way from the eye to the mouth; sides of the head and of the body of a beautiful crimson colour; dorsal and caudal fins, brown, spotted with blue; pectorals translucent; ventrals and anal of a dark crimson red.

Tolerably abundant, particularly in May.

LETHRINUS GLYPHODON.

Lethrinus glyphodon? Gunther; Cat. Vol. I, p. 462.

The body is convex, high, contained three times in the total length of the fish; the head a little over three times and a-half in the same; the snout elongate and pointed; the diameter of the eye is contained twice in the length of the snout. The upper maxillary reaches to the vertical from the posterior nostril; molar teeth on the posterior part of the jaws; the canine ones of moderate size; the fifth dorsal spine is the longest, the others gradually decrease; some of the dorsal spines are alternately rather thicker than the others. The pectorals long, extending to the base of the anal. Caudal fin very strongly emarginate.

Of a dull olive colour, with very indistinct lighter spots on a part of the scales; cheeks and opercles yellow; dorsal fin with indistinct dark spots; others forming two transverse lines on the caudal.

The specimen is about thirteen inches long. I believe it is the same as *glyphodon*, described from specimens brought from the Louisiade Archipelago by Macgillivray.

PAGRUS UNICOLOR.

Pagrus unicolor, Quoy. & Gaim; Uranie, p. 299.

The *Schnapper* is very common at Sydney, but the specimens are generally small. At Melbourne, the very large old males have alone the curious frontal protuberance that give such an extraordi-

nary appearance to some of the specimens; but at Sydney, I have often seen very young males having to a less degree the same formation.

CHRY SOPH RYS AUSTRALIS.

Chrysophrys Australis; Gunther's Catal., vol. I., p. 494.

The common *Bream* always to be seen in the Sydney market.

CHRY SOPH RYS SARBA.

Chrysophrys Sarba; Forsk., p. 31.

Cuv. Val., vol. VI., p. 102.

Black Bream, at Sydney; body very high; contained rather over twice in total length, without the caudal fin; head a little over three times in the same; pectorals very long; dorsal with eleven spines—the fourth the longest, and eleven rays; caudal very forked; anal with three spines and eight rays; the first of these spines short, the second very strong and very long, the third shorter.

Of a beautiful gilt colour, with the operculum dark, almost purple; the fins hyaline, with the rays yellow; the dorsal edged with black; the caudal having its external half black; the anterior part of the head dark.

From twelve to eighteen inches long. The teeth are strong, conical, rather arched; the molars in four series above and in three below.

APHAREUS ROSEUS.

Body oblong; its height equal to the length of the head, and contained three times and a half in the total length, without the caudal fin; fin rays feeble; dorsal with ten spines and eleven rays; the fourth and fifth being the longest, and the others become rather shorter as they extend backwards; caudal much forked; anal, with three feeble spines, the first the shortest, and the third the longest, and eight rays, the last ray of the dorsal and of the anal at least twice as long as the preceding; body scales large; the præopercle covered with oblique striæ, and finely serrated on its edge; the opercles scaly; pectorals and ventrals long; the first nearly of the length of the head. Colour of a beautiful soft pink; the lower parts of a silvery white; general form of *Dentex*; there are sixty-four scales on the lateral line.

I have only seen one specimen of this beautiful fish. It was caught on the 20th of March, 1878. It measures nearly two feet in length. The anterior part of the head seems to have been injured at a previous part of its life, probably by the bite of some other fish, as the snout seems to be abnormally short.

If it had not been for the very good figure given by Cuvier and Valenciennes of a species of this genus (*furcatus*, pl. 167), I should not have been able to find it out in the system, as the characters of the genus given by Dr. Gunther are very defective. He says, "Præoperculum entire, scales rather small." Cuvier, on the other hand, figures and describes the strong striæ of the præopercle, which in some sorts become a striated edge; but having only seen one specimen, I cannot say if this character is permanent. This sort seems to me to be the one that Dr. Blecker thinks (Amboyna, p. 52) to belong to *rutilans* of Cuvier, but it is very different, by the number of its spines and rays.

It would thus be an inhabitant of the Molluccas, and would visit the east coast of Australia during the warm months of the year.

In the journal, Mus. Godeff. Fishes No. III, p. 16, Dr. Gunther places *Aphareus cærulescens* under the name of *furcatus*, Lacep. III, p. 421, and 477, fig. 1.

In that work he places this genus between *Aprion* and *Priacanthus*. In the catalogue he had placed it in the *Pristipomatidæ*, and Cuvier places it in an appendix to the *Sparoidæ*.

APLODACTYLUS OBSCURUS.

On each jaw two lines of tricuspid teeth; some of these teeth are single pointed, but serrated on their sides; the cheeks and opercles are covered with small scales; the head is high; rounded in front; depressed behind the eyes; the back rather gibbous in front; pectorals with seven simple rays, of which the seventh, or the uppermost, is the longest; it projects only very little beyond its membrane. The dorsal has seventeen spines, the fifth and sixth of which are the longest; the soft part of the fin is formed of nineteen rays, nearly three times as long as the last spine; the caudal is forked;

the anal has three spines and six rays; the body scales are rather large; along the base of the spinous dorsal there is a sheath covered with very minute scales; the colour is nearly black; the dorsal, caudal, and anal fins are variegated with grey; the largest specimen is thirteen inches in length; the other about nine; only seen twice in the Sydney market in September. The form of the teeth obliges me to put this fish in the genus *Aplodactylus*, but it evidently comes very near *Chironemus*, and I certainly think that, on account of the simple lower rays of the pectorals, ought to be placed in the same family; the number of the simple rays (seven) does not allow me to unite this fish with the species *arctidens* or *lophodon*.

ATYPICHTHYS STRIGATUS.

Atypus strigatus, Gunth. Catal., vol. II, p. 64.

This fish looks very much like some species of *Chatodon*, but the body is of a longer oval; it is silvery white, with five very broad longitudinal brown stripes on the sides, and on the sides of the head; fins of a bright yellow; it does not attain more than five or six inches in length; very common at Port Jackson, and usually used as bait by the fishermen.

NEOCHÆTODON VITTATUS.

Neochætodon vittatus, Cast., Proceed. Zool. Soc. of Victoria, vol. II., page 130.

Specimens entirely similar to the one from Swan River are caught at Port Jackson; it resembles very much Cuvier's figure of *Chatodon strigatus*, and I should have united it with it if it had not been for the opercule, which is strongly emarginated on its upper part, forming thus two points.

The specimens are usually five inches long; when fresh, they are of a silvery-white, with five or six broad brown longitudinal stripes on the sides; the lower ones being oblique; the base of the caudal is of the same colour; the stripes extend on the head, and two of them follow the forehead; there is also one in front of the eye.

Found in the warm season.

SCATOPHAGUS MULTIFASCIATUS.

I have obtained, at Sydney, a very pretty variety of this species. It is a very large specimen, measuring sixteen inches in length ; of a beautiful light grey colour, with the twelve transverse bands, of a fine black, and all of equal length and breadth ; the caudal is rather rounded.

In some specimens, a part of the transverse bands disappear. I have one in which five alone are visible. I believe this to be *Chætodon tetracanthus* of Lacepede. In that case, the sort would have to bear the last specific name. In my paper on the fishes of the Norman River, I mention that specimens from that part seem different from the ordinary *multifasciatus*, and I proposed to call them *alternans* (*Alttermans* by misprint).

SCORPIS ÆQUIPINNIS.

Scorpiæ æquipinnis, Richard ; Ereb. and Terror, Fishes, p. 121.

Height, twice and-a-half in the total length of the fish ; head, four times in the same ; body very compressed, covered with rather small scales ; dorsal with ten low spines and twenty-seven rays ; anal with three spines, and also twenty-seven rays ; the spines increase in length backwards ; the rays of the dorsal and anal decrease in height as they extend backwards, and none of them are elevated.

The colour is of a dark brown, rather lighter towards the belly ; the upper and lower edges of the caudal are black.

Length over one foot.

CHEILODACTYLUS FUSCUS.

Six simple rays in the pectorals ; the upper one not much longer than the branched ones ; the following very long, its free part being very nearly one-half of its length, the others become gradually shorter ; dorsal scarcely notched ; the spiny part formed of seventeen spines, of which the first is rather short and the fourth the longest ; this fin is inserted nearly on the perpendicular from the posterior edge of the orbit ; the back is gibbous ; there is an eminence on the anterior edge of the orbit ; the caudal is strongly emarginate ; the anal has three spines and nine rays.

Uniform brown ; one foot long.

CHEILODACTYLUS ANNULARIS.

Six simple pectoral rays; the uppermost of which extends to the base of the third anal spine; body compressed, high; the anterior profile of the head presents an angle in front of the centre of the eye; back gibbous; dorsal fin nearly equal in all its length, and not sensibly notched; the spinous part formed of seventeen spines, of which the fourth is the longest; the soft portion rather higher than the last spines, of thirty-two rays; caudal strongly forked; anal with three spines—the first short and the third rather longer than the second; the soft part is formed of nine rays.

Entirely of a lilac brown, with a white streak behind the eye, and two white rings round the tail; the fins are dark with the exception of the pectorals, which are of a light colour; the long ray being white.

This unique specimen is about nine inches long, and was taken in February.

ZEODRIUS.

The six lower pectoral rays are simple; dorsal with thirteen long spines, and one or more short ones in front; several lines of small acute teeth on both jaws, others pavement like, covering the palate; the opercles entire; scales rather large; general form, high in front, tapering towards the extremity caudal strongly forked; lateral line, entire; like *Eques* of the *Sciaenidae*. This new genus of *Cirrhitidae* comes near *Chironemus*.

ZEODRIUS VESTITUS.

Mouth small and rather advanced; upper profile convex over the eye, and very high and gibbous behind it; the highest part of the fish being over the angle of the opercule; in this part, the height of the body is only contained twice and-a-half in the length, without the caudal fin; the head is three times and-a-half in the same length; the diameter of the eye is three times and-a-half in the length of the head; sides of the head scaly; the dorsal fin is formed of one short spine, one very long one, the five following gradually decreasing, the rest equal; the soft part formed of thirty-four rays; the caudal long, very strongly

forked; the anal very short, with three spines, of which the middle one is the longest, and seven rays, the two first of which are longer than the others; ventrals inserted below the ninth spine of the dorsal; pectorals large, placed at the two inferior thirds of the height; the fifth ray longer than the others, the fourth nearly equal; all the simple rays much longer than the membranes that unite them.

Of a rather dirty silvery white; a broad dark brown stripe beginning below the fourth dorsal spine, and running along the back, and covering the lower lobe of the caudal fin; a similar transverse oblique band runs from the anterior part of the dorsal to the belly; another is in front of this and runs behind the pectoral; a still more oblique band crosses the eye and extends on the cheeks; and a last runs round the mouth; the fins are of a brilliant yellow; the anterior part of the ventrals and the membranes, between the third to the eighth dorsal spines, brown.

The specimen is eight inches long, and was caught at the end of June.

The *Osteodactylus vestitus* (Garrett, Proceed. Calif. Acad. 1863) so handsomely figured by Dr. Gunther (Mus. Godeffroy, pl. 41) must also be placed in this genus. It is very similar in form and in the disposition of colours to the Australian sort, but five rays of its pectorals are much shorter, and it has four small spines in front of the long dorsal one. It comes from the Sandwich Islands.

SCORPENA CARDINALIS.

Scorpena cardinalis, Rich.; Ann. A. Mag. Nat. H., 1842, p. 212.

Principally distinguished from *cruenta* by the entire or nearly entire absence of the black blotch of the first dorsal.

Also called Rock Cod at Sydney.

Generally of a beautiful scarlet colour; sometimes brown on the back.

SCORPENA CRUENTA.

Scorpena cruenta, Solander; Richards Ann. and Mag. Nat. Hist., 1842, p. 217.

militaris; Voy. Ereb. and Terror, Fishes, p. 21, pl. 14, fig. 1—2.

Of a beautiful scarlet colour—sometimes marbled with grey; belly whitish; sides having rounded dark blotches; the fins are of a reddish pink, variegated with white; the first dorsal has a large black blotch covering nearly the upper half of its posterior part; there are a few black spots on the soft dorsal; they are transversely marbled with white and red; the ventrals are pink; the pectorals beautifully marbled with pink, white, and brown.

It is called Red Rock Cod at Sydney; is not scarce, and is very much esteemed for the table.

SEBASTES PERCOIDES.

Sebastes percoides, Rich.; Ereb. and Terror, Fishes, p. 23, pl. 15.

This beautiful fish is of a fine orange scarlet, with the lower parts of the first of these colours, with three or four very broad brown transverse bands on the body.

According to Dr. Gunther (Ann. and Mag. of Nat. Hist., 1876, p. 392) my *Sebastes Alporti* would be the same as this species. This may be the case, but the proportions appear to be very different.

PLATYCEPHALUS FUSCUS.

Platycephalus fuscus; Cuv. Val. vol. IV., p. 84.

Spines of the head feeble; the two at the angle of the præopercle strong, and nearly equal; body nearly black; below white; dorsal hyaline, with the spines and rays spotted with brown; caudal with its upper part spotted and the lower obscure; a large black rounded spot on the end of the caudal, at about one-third of its height; anal white; ventrals and pectorals yellow, finely spotted with green.

This is the common *Flat Head* of the Sydney Market; particularly common in winter.

PLATYCEPHALUS BASSENSIS.

Platycephalus Bassensis; Cuv. Val. vol. IV., p. 247.

Tasmanianus, Rich.; Ereb. and Terror, p. 23, pl. 18.

Called at Sydney the *Red Flat Head*. It does not appear very commonly; at Melbourne it is perhaps the most common fish in the market.

TRIGLA KUMU.

Trigla Kumu; Lesson and Garnot Voyage Coquille Poiss., pl. 19.

Of a lilac grey, without spots; lower parts of a silvery-white; fins pink; pectorals entirely of a blackish green, with a large black blotch spotted with white; each of these spots is surrounded by a circle of a fine bright blue.

Only one specimen seen on the 27th of October, 1877. It is said to be common on the New Zealand Coast.

SILLAGO MACULATA.

Sillago maculata; Quoy. and Gaim., Exped. Freycinet Zool., pl. 53, p. 2.

Back of a greenish olive, with very feeble dark transverse spots or bands; a narrow longitudinal white streak on each side; belly silvery; head of a greenish golden colour; the first dorsal with small obscure specks, and the second with regular longitudinal lines of spots similar to the others; a black spot at the base of the pectorals; fins of a greenish yellow; the end of the caudal obscure; ventrals yellow.

Very common in the Sydney market, and known as the *Whiting*. Only found accidentally and very rarely in the Melbourne Sea.

SILLAGO BASSENSIS.

Sillago Bassensis; Gunther's Catal., vol. III., p. 412.

Terra-Regina, Cast.; Proceed. Linn. Soc. N.S.W., vol. II. p. 232.

Called at Sydney *Trumpeter Whiting*. Of a beautiful light silvery blue on the back; silvery white on the belly, with a rather broad white stripe on each side of the body; head white, with a silvery tinge; opercles very finely dotted with black; the two dorsals of a light yellow, with very small black spots; the caudal olive yellow, with its extremity obscure; pectorals transparent; ventrals of an orange yellow; a black spot at the base of the pectorals. When taken, is said to produce a singular noise.

Very common also at Brisbane, where it is the common whiting.

Seems, according to Cuvier, to have also been found at Western Port by D'Urville's Expedition.

The species of *Sillago* are very nearly allied one to the other. I think the Australian can be characterised in the following way:—

Body covered with obscure dots *punctata*.

Body not punctated :—

a. Dark spots on the back *maculata*.

b. No spots; a longitudinal band } *Bassensis*, Cuv. Val.; *ciliata*,
on the sides... .. } Gunth.; *Terræ-Reginæ*, Cast.

c. No spots; no longitudinal bands on the sides... *ciliata*, Cuv. Cast.

punctata is the common sort of Melbourne; *ciliata*, on the Eastern and Western Coasts of Australia and in the New Caledonia Sea; *Bassensis*, on the Eastern Shores of Australia, as also *maculata*.

SCIÆNA AQUILA ?

Sciæna aquila ? Lacep, vol. V., p. 685.

antarctica, Cast.; Proceed. Zool. Soc. Vict., Vol. I., p. 100.

I am not certain that this is the same as *aquila*, but it is said to be so; at Melbourne it is called the "King-fish," and it is so scarce that during many years I only saw two specimens, both of enormous size, weighing about eighty pounds; at Brisbane it is called "Dew-fish, and at Sydney "Jew-fish." It is very common in both these places, but the specimens are generally small, and I never saw a full adult. If this is really *aquila* it is to be found in the Mediterranean, and is also very abundant at the Cape of Good Hope.

SPHYRÆNA NOVÆ HOLLANDIÆ.

Sphyræna novæ Hollandiæ, Gunth. Cat., Vol. II., p. 339.

This Pike appears rather frequently in the Sydney market; but all that I have seen were small, compared with those of Melbourne.

ELACATE NIGRA.

Scomber nigra, Bloch., pl. 337.

Centronotus Gardenii Lacep., Vol. III., p. 357.

Elacate Pondiceriana Ouw. Val., Vol. VIII., p. 329.

„ *nigra*, Gunth. Cat., Vol. II., p. 375.

Eight spines before the dorsal; this is long, high in front, getting lower towards the tail, and occupies more than the posterior half of the body; anal having the same form, and beginning rather behind the dorsal; head depressed, caudal forked, forming two equal pointed lobes.

General color, of a dark brownish grey, the lower parts of a dirty white, a badly defined white stripe on each side of the body.

I believe this fish to be very scarce at Sydney, as it was unknown to the fishmongers.

The length of the above described specimen is two feet ten inches; it was caught on the 20th February, 1878.

By the form of its caudal it seems to differ from the Indian species, but this may be owing to its old age.

ECHENEIS NAUCRATES.

Echeneis naucrates, Linn. Syst. Nat., Vol. I, p. 441.

This curious fish is found in nearly all the warm seas of the world; I saw it at Sydney in the month of April.

The color is nearly black, tinged with slatey-grey, the lower parts being of a dirty white.

AUXIS RAMSAYI.

Height of the body four and a half times in total length without the caudal fin; head, three and two-thirds in the same; the pectorals reach nearly to the end of the base of the dorsal, six finlets behind the second dorsal, and the same number behind the anal; first dorsal with nine spines, second with the same number of rays, anal with sixteen rays, the last elongated, and more than half as long as the third, which is the longest.

Scales, similar to those which form the corselet, but much smaller, extend along the lateral line to the vertical from the fifth dorsal finlet, forming a broad stripe; lateral line undulated.

The general colour is dark lead, the back is black with numerous oblique bands of the same colour, extending to below the lateral line as in *Pelamys Sarda*; no trace of wavy black streaks; the fins are whitish, with the anterior part of the first dorsal, and the middle of the caudal obscure, the inner side of the pectorals black.

On the 6th April, 1878, numerous specimens of this species appeared in the Sydney market, the fishmongers call them *horse mackerel*; it is said to be a good fish for the table. I have dedicated this species to the learned Curator of the Sydney Museum.

TRACHURUS DECLIVIS

Oaranz declivis. *Jenyns, Zool. "Beagle," Fishes, p. 68, pl. 14.*

Trachurus Trachurus, *Gunther Cat., Vol. II., p. 420.*

Dr. Gunther considers this fish the same as the European species; my reason for keeping it distinct is that it is always much smaller in Australia, and remarkable for the bright yellow colour of its caudal fin; the body plates number seventy-nine or eighty.

It is a very common species in Port Jackson, particularly near the Heads.

TRACHYNOTUS OVATUS.

Gasterosteus ovatus. *Linn. Syst. Nat. Vol. I., p. 490.*

Trachynotus ovatus, *Gunth. Cat., Vol. II., p. 481.*

Height of body contained twice and one-third in total length, without the caudal; the maxillary reaches to the anterior third of the eye; the lateral line is almost straight; the anterior parts of the dorsal and anal very much elongated, the first formed of one spine and twenty-three rays, the second of one spine and twenty-two rays, the short spines in front of the dorsal are six in number without the horizontal one, or seven in all, the caudal is very forked; the ventrals are small.

The back is of a silvery-grey with the sides and belly of a fine white, on the back are six faint transverse bands of a greyish purple, fins of a dark slatey colour, with the pectorals, ventrals, and inner side of the caudal white.

Only seen twice in May and once in August, the specimens were about a foot long.

N.B.—On the two larger specimens there were four or five obscure rounded blotches over the lateral line.

BLEPHARIS CILIARIS.

Zeus ciliaris, *Bloch., Vol. VI., p. 29, pl. 191.*

Blepharis indicus, *Cuv. and Val., Vol. IX., p. 154.*

Found also in the Red, and all over the Indian Seas.

Of a silvery white; back of a fine light blue; base of dorsal and ventrals black; the long filaments of the dorsal and anal white at the base, and black on the rest of their length.

During life there is no trace of the transverse bands, which appear after death in *most* cases.

PEMPHERIS COMPRESSUS.

Sparus compressus, *White Journ. Voy. N. S. Wales*, app., p. 267.

Pempheris compressus, *Gunth. Cat.*, Vol. II., p. 508.

The height of the body is contained twice and a half in the total length, without the caudal fin, the upper lobe of the caudal is much longer than the lower; of a rosy brown, with the lateral line of a bright golden yellow, the anterior edge of the dorsal, and the greater part of the anal and ventrals black.

Not very scarce at Sydney, and also found, according to Dr. Gunther, at Swan River.

ELEOTRIS AUSTRALIS.

Eleotris Australis *Gunth.*, *P.Z.S.* 1864, p. 188.

Mr. Duboulay has given me several specimens of an *Eleotris*, which belongs without doubt to the species I refer it to.

The colour is of an orange-yellow, with six longitudinal black stripes on the sides; the two most central are generally united by transverse lines, making the yellow part to appear like rounded spots; the second dorsal and caudal, pinkish, spotted with brown; a deep groove on the upper part of the back.

The longest specimen is about four inches.

From Ropes' Creek, also from the immediate vicinity of Sydney.

BLENNIUS UNICORNIS.

Height of body five times in the total length without the caudal, or six times with it; body elongate, head obliquely truncated in front, without tentacles; an arched fleshy horn directed upwards on the forehead; the dorsal beginning over the end of the opercle; the last rays extending slightly over the caudal fin which is rounded.

Of an olive colour with the belly and pectorals yellow, cheeks and upper part of the head black, a series of transverse black spots on the anterior half of the body; on the posterior part they form five irregular longitudinal lines.

This little fish, which is about two inches long, enters the

oysters about Sydney and destroys them. I am indebted for this information to Mr. Joubert, who found several in oysters, the animals of which had been more or less eaten.

CRISTICEPS MACLEAYI.

Body rather elongate, its greatest height being contained three times and one third in the total length without the caudal fin; head four times in the same; forehead oblique and straight, the lower jaw rather longer than the upper; snout a little longer than the eye, a fringed tentacle on the nostrils and another over the orbit; the first dorsal two-thirds of the height of the body, it is placed over the posterior third of the eye; second dorsal formed of thirty-four rays or spines; the caudal long and pointed; the anal with twenty-five rays; the pectorals are of moderate length; the second dorsal is placed farther backwards on the tail than the anal, but both are attached to it by a membrane.

The fish is entirely of a reddish-brown, with the fins orange.

The only specimen I have seen is 7 inches long, and in the collection of Mr. Wm. Macleay, who communicated it to me under the name of *Australis*, but that species is described by Cuvier and Valenciennes as having transverse bands, and as inhabiting Tasmania, and I believe it is the one I described under the name of *Howittii*; Proceed. Zool. Soc. Victoria, Vol. II., p. 48.

N.B.—Dr. Gunther mentions a fish from Port Jackson that he considers as belonging to the European *Oristiceps argentatus*, but at the same time finding constant differences between the two, he says that "those who consider this variety as a separate species may call it *Oristiceps antinectis*;" or in other words this means that the Australian *Oristiceps* is *argentatus* but at the same time it is not; so that though it is *argentatus* it will have to be called *antinectis*; showing once more into what confusion zoologists fall when they want to establish local varieties instead of admitting all such *constant varieties* as distinct species, particularly when they are found in different regions. It is evident that the number of Australian species of this genus is very large, and their study is rendered still more difficult by the fact that the old authors considered them all as one; I cannot on description

place *aurantiacus* and *Macleayi* with any yet described, but the specimens ought to be compared with *nasutus* and *roseus* of Gunther.

CRISTICEPS AURANTIACUS.

Body elongate, its height contained four times and a half in the total length without the caudal fin; head not quite four times in the same; forehead concave; snout longer than the eye; the lower jaw longer than the upper; a fringed tentacle on the nostril and one over the orbit; the first dorsal nearly as high as the body, and placed in front of the eye; the first spine being the longest, the third being one-third shorter; the second dorsal much lower, consists of twenty-nine spines, and seven rays; the tail is long and narrow; the caudal is long, pointed, and formed of nine long rays; the anal, like the dorsal does not reach the base of the caudal, it is formed of two short spines, and twenty-four rays; the pectorals are large and formed of ten strong fleshy simple rays; the ventrals, of three similar ones.

The fish is of a beautiful orange colour, with the fins of a fine yellow; the specimen is eight and a half inches long, and was found at Kiama by Mr. Duboulay, it is also found at Sydney.

N.B.—This species comes very near my *Cristicops splendens*, but differs, by the first dorsal being placed in front of the eye; by the space between the two dorsals being only equal to the length of the first of these fins; and by the second dorsal being placed more forward, its third spine being in a line vertical to the end of the operculum.

I find this fish in the Sydney museum under the name of *Australis*, *Ow. & Val.*, but the figure given by those naturalists (pl. 336) can in no possible manner apply to *aurantiacus*.

TEUTHIS JAVUS.

Linn. Syst. Nat. Vol. I., p. 507.

Of a blackish grey; lower parts of a pearly blueish white, the small round spots on the back of a light blue; fins of an olive colour, though slightly marbled with brown.

MUGIL GRANDIS.

General form high, the profile strongly convex; an adipose

eyelid covering one-third of the orbit; anal fin with eight soft rays; forty-two scales on the lateral line; pectorals a little above the middle of the body; the height of the body is contained three times and one-third in the total length without the caudal or four times with it; the head is about five times in the last measurement; the space at the chin between the mandibles and interopercles is broad and oval; the head is very broad; the pectorals extend to the sixth scale of the lateral line; there are some scales on the vertical fins, and a remarkable series in front of the third spine of the first dorsal; caudal emarginate; the first dorsal spine is considerably longer than the others.

All the specimens I have seen of this species were of large size, up to two feet in length; they are found in the open sea, and appear in great numbers at the beginning of the winter; it is in high esteem for the table.

N.B.—This species seems to come near *M. cephalus* of the Mediterranean, and has also the appearance of *dobula*, but the head is much broader, as is also the space on the chin between the mandibles.

I believe this is the "sand mullet" of Melbourne, that I had taken for *Mugil waigiensis* of Quoy and Gaimard, but which cannot be this sort on account of its adipose eyelid.

MUGIL DOBULA.

Mugil dobula, Gunth. Cat. Vol. III., p. 421.

Adipose eyelid well developed; forty scales on the lateral line; anal with eight soft rays; head broad; the angle made by the anterior margins of the mandibular bones very acute; caudal deeply forked.

Colour silvery white; the back of a dark brown; head slightly gilt; fins grey and transparent; caudal bordered with black; anal white.

Generally from ten to fifteen inches long; frequenting bays and marshes; it also ascends rivers to a great distance, and is to be found in almost all those of New South Wales and Queensland.

MUGIL PERONII.

Mugil Peronii, Cuv. & Val., XI., p. 138.

I have already mentioned this species in my paper on the fishes of Victoria (Proceed. Zool. Soc. of Vict. vol. II., p. 151); it seems to be very rare in the southern parts of Australia, but is common in the neighbourhood of Sydney.

It may be characterized thus:—No developed adipose eyelid; anal fin with ten soft rays; no pointed axillary scale; tail compressed and very high; caudal very strongly emarginated; body compressed; its greatest height being behind the half of the body; head pointed.

Colour very silvery; back dark, with a beautiful blue tinge; fins rather dark; a bright golden spot on the opercle in front of the insertion of the pectorals, and another behind the eye.

Usual size about a foot long; it frequents the bays, estuaries, and lagoons of the coast.

FISTULARIA SERRATA.

Fistularia Tabaccaria, White, N. S. Wales, p. 296, pl. 2.

serrata, Ouw. Regn. anim., Vol. II., p. 267.

Found all over the Indian sea; pretty plentiful at Sydney, particularly in May and June.

It is of an olive green, lower part white; the eye is green.

HELIASTES HIPPILEPIS.

Heliastes hippilepis, Gunth. Ann. & Mag. Nat. Hist. Vol. 20, p. 66.

Height of body contained twice and one-third in total length, without the caudal fin; head three times and one-third in the same; preopercle striated, and almost (?) finely serrated on its lower edge; eye very large; the diameter of the eye of the length of the snout; scales of the body large, twice as high as long, numbering twenty-eight or twenty-nine; dorsal formed of thirteen spines, and fourteen rays; caudal deeply forked; anal with two spines the first short, the other nearly four times as long; pectorals long.

The colour of a dark olive green; lighter and inclined to yellow on the sides of the head and on the belly; base of the pectorals black.

Size, six and a half inches long.

LABRICHTHYS GYMNOGENIS.

Labrichthys gymno-genis, Gunth. Cat., vol. IV., p. 117.

Snout rather pointed; head naked, covered with pores; a single series of scales extending from behind the eye to the cheek, where the scales become small and disappear; a posterior canine tooth, and two canines in front in both jaws; lateral line marked by very complicated arbuscules.

Entirely of a dark green, becoming rather yellow on the lower parts of the head; dorsal and anal crimson bordered with black on their upper edges; a series of very faint, round, light blue spots on each membrane near the base; caudal green, with its base orange; ventrals green with a black longitudinal stripe near the spine; pectorals yellow; the tail of a light yellowish green.

N.B.—The specimens are about eleven inches long; when fresh there were numerous round light pink spots on the body, but they have disappeared on the specimens preserved in spirits.

LABRICHTHYS PARILA.

Labrichthys parila, Gunth. Cat. Vol. IV, p. 117.

Tautoga parila, Richards, Proc. Zool. Soc., 1850, p. 70.

Of a fine light brown, with a longitudinal series of oblong spots; these are white on the anterior part of the fish, and pink on the posterior; dorsal whitish in front, orange on its posterior part, with a very faint longitudinal stripe in the middle; caudal truncate, orange; anal of a fine orange, with the extremity of the rays white, bordered with a black line; pectorals yellow; upper part of the head and cheeks grey.

There is no posterior canine; the head is covered with fine granulations and pores; the operculum has large scales, but the præoperculum and cheeks are naked, with the exception of a line of scales extending behind the eye.

The specimen is eight inches long.

COSSYPHUS UNIMACULATUS.

Cossyphus unimaculatus, Gunth. Cat., Vol. IV, p. 109.

Head large, very pointed in front; præopercle finely serrated; dorsal with twelve spines and eleven rays; anal with three spines and twelve rays; a tooth at the commissure of the jaws.

Of a beautiful carmine, with the lower parts of a whitish yellow; an oval black blotch bordered with white on the dorsal, extending over the sixth, seventh, and sometimes the eighth spine; in some specimens this blotch is divided into two or three spots, but the central one is always much larger than the others. In some specimens there is on a part of the scales a round whitish spot.

Rather plentiful at Sydney, and often called "Pig Fish" on account of its elongated snout.

CORIS LINEOLATA.

Coris lineolata, Gunth. Cat., vol. IV, p. 206.

Julis lineolata, Cuv. and Val., vol. XIII, p. 436.

„ *cyanogramma*, Richards, Ann. and Mag. Nat. Hist., vol. VII, 1851, p. 289.

Of a beautiful carmine pink on the upper parts, the sides and belly of a silvery white; a broad longitudinal black stripe, irregular on its edges, extending along the sides; throat obscure; arched oblique lines of a fine light blue on the sides of the head, and one in the middle; an oval black spot on the dorsal extending over the sixth, seventh, and sometimes the eighth spine; this spot, which is sometimes divided into two or three, is bordered with white. The base of the dorsal and pectorals orange, the remaining portion pink; two or three longitudinal white lines extend entirely along the dorsal fin; a small variety has no black band on the sides.

This beautiful species was discovered by Peron, since which Quoy and Gaimard found it at Western Port. The British Museum has received it from Swan River.

I have only seen it at Sydney, where it is rather common during the warm season.

ODAX SEMIFASCIATUS.

Odax semifasciatus, Cuv. and Val., vol. XIV, p. 297, pl. 407.

Very much like *Richardsoni*, but with the præopercle entire.

It is called "rook whiting" at Sydney, and is fourteen inches long; obtained in May.

The colour varies much, being sometimes entirely of a fine

sky blue, with a golden spot on each scale; sometimes of a brilliant green, with the belly white, but always with transverse black spots on the superior half of the back.

ODAX OBSCURUS.

Odax obscurus, *Cast. Proceed. Zool. Soc. Vict.*, vol. I, p. 154.

One small specimen, similar to those from Victoria, in the beginning of June.

GERRES OVATUS.

Gerres ovatus, *Gunth. Cat.*, Vol. IV., p. 257.

Body high and oval; its height contained once and one-fifth in the total length, without the caudal fin, the second spine of the dorsal being the longest; the third of the anal longer, but more slender than the second, head rather pointed, pectorals long.

Entirely of a silvery grey, having a yellow tinge on the lower parts; fins yellow, the dorsal finely bordered with black.

Specimen eight inches long.

LOTELLA CALLARIAS.

Lotella callarias, *Gunth. Mag. Nat. Hist.*, 1863, p. 116.

Height of body contained four times and one-third in the total length, without the caudal fin, head not quite four times in the same; upper profile convex; the highest part of the fish a little behind the first dorsal, and from thence tapering posteriorly; the teeth on the upper jaw form a band, with an external line of larger ones set considerably apart; on the lower jaw there is only the external series.

PSEUDORHOMBUS RUSSELLII.

Pseudorhombus Russellii, *Gunth. Cat.*, Vol. IV., p. 424.

Platessa Russellii, *Gray, Ill. Ind. Zool.*

Called the "Flounder" at Sydney, where it often appears in the market; the colour is of a dark brown, with the fins lighter, inclining to yellow, and covered with small black spots.

Mouth very extensible; caudal pointed; the rays of the dorsal are scaly on the two posterior thirds of the fin.

Dentition more developed on the coloured than on the blind side.

D. 69. A. 53. V. 5. P. 8.

N.B.—This fish is evidently different from the Melbourne "Flounder."

SYNAPTURA QUAGGA.

Synaptura quagga, Gunth. Cat., Vol. IV., p. 485.

Æsopia quagga, Kaup. in Wiegmann Arch., 1858, p. 98.

Body oblong; the left pectoral fin is only rudimentary; the jaws are of equal length; the lower eye is rather behind the upper one.

Of a fine dark brown, with ten light transverse bands, which are slightly bordered with black.

This species is rather common in the China and Indian Seas, and seems to be found nearly all round Australia, but to be very scarce in these parts.

I have seen it at Sydney and Brisbane; and Mr. Bostock sent me one from Swan River.

CNIDOGLANIS MEGASTOMA.

Cnidoglanis megastoma, Gunth. Cat., Vol. V., p. 27.

Plotosus megastoma, Richards, Voy. Erebus and Terra del Fuego, p. 31., pl. 21.

Most of the Australian *Siluridae* belong to the group *Plotosinae*, characterized by the presence of a short anterior dorsal, and the second dorsal very long and continuous with the caudal and anal, the ventrals are many-rayed.

The genus *Cnidoglanis* is distinguished by its small eyes, and the gill membranes united below the throat, and attached to the isthmus along the entire median line; the genus was first established by Dr. Gunther.

This species is known at Sydney as the "Cat-fish"; the head is very broad; the barbels extend a very little behind the eye.

The colour is of a dark olive brown on the back, with the lower parts of a dirty white; mouth, anterior part of the head, and spots on the body, of a beautiful orange yellow. The usual size is about thirty inches. This fish is very strong, very difficult to

kill, and fights to the last; its motions are very rapid, and it inflicts dangerous wounds with its strong dorsal and pectoral spines.

When wounded it loses a large quantity of blood of a dark red colour.

Not common in Port Jackson; taken with the hook; it is not usually used for food.

ONIDOGLANIS LEPTURUS. ?

Onidoglanis lepturus ? Gunth. Cat. Vol. V., p. 28.

"Dog-fish" at Sydney.

Height of the body, six times and a half in the total length without the caudal fin; head rather depressed, its breadth being only one-fifth less than its length, it is five times in the total length without the caudal; the nasal and maxillary barbels do not extend sensibly further than the eyes; eye small; the first dorsal high, the second only one-third of its height; vomerine teeth, molar-like, in a double triangular band, those of the maxillary short, conical, in two patches of two, those of the lower jaw molar-like, with an external line of conical ones; lower lip pendant, broad, covered with tubercles, and fringed; a few granulations on the sides of the head, before and below the eye. Of a dark slaty colour, with the lower parts of a dirty-white; about fifteen inches long.

SAURIDA AUSTRALIS.

Height of body contained eight and a half times in the total length, without the caudal; head four times and two-thirds in the same. Upper jaw longer than the lower; eye contained six times in the length of the head, and rather longer than the snout; the pectoral extends to the end of the ninth scale of the lateral line, this forms a slight keel on the posterior half of the fish; the dorsal has eleven rays, it is a little higher than long; the anal has eleven rays; the number of scales on the lateral line is fifty-eight; the caudal is emarginate.

The general colour is of an olive green; the sides of the head rather gilt; a longitudinal narrow and faint white streak extends on the fresh specimens below the lateral line, and another lower

down; lips pink; lower parts white; dorsal adipose; pectorals and caudal olive, anals and ventrals white.

Total length of the specimen fourteen inches, taken in the month of May.

N.B.—The number of the fin rays seems to unite this species with *undosquamis*, of Richardson, but the pectorals are much shorter, and are far from extending to near the vertical of the origin of the dorsal.

HEMIRHAMPHUS REGULARIS.

Hemirhamphus regularis, Gunth. Cat., Vol. VI., p. 261.

The common "gar-fish" of the Sydney market; general colour of the back, dark blue; a broad silvery band on each side; caudal black; the upper jaw is rather broad.

N.B.—The fishmongers distinguish two sorts; one is larger, and has more small black lines on the back; they say that this is the only one that can be preserved.

HEMIRHAMPHUS MELANOCHIR.

Hemirhamphus melanochir, Ouw. & Val., Vol. XIX, p. 41,
intermedius, Cantor & Gunther.

Of a light green; a very narrow silvery band on each side; caudal black; upper jaw much more narrow than in the preceding species.

Equally common at Melbourne, Swan River, Brisbane, and Sydney; found also in the Indian Sea.

HEMIRHAMPHUS ARGENTEUS.

Hemirhamphus argenteus, Bennett, Whaling Voy., Vol. II., p. 269, figured.

Hemirhamphus breviceps, Cast., Proceed. Linn. Soc. N.S.W., Vol. II, p. 240.

Remarkable for its comparatively short lower jaw.

Common at Brisbane, but only seen once at Sydney.

BELONE FEROX.

Belone ferox, Gunth. Cat., vol. VI., p. 242.

The back of the tail is broad and depressed; the posterior

rays of the dorsal are short and about equal to the others.

Very plentiful in the market.

CLUPEA MOLUCCENSIS.

Clupea moluccensis ? Bleeker, *Nat. Tyd. Ned. Ind.*, vol. IV, p. 609.

The body is very compressed ; height contained twice and one-third in the total length, without the caudal ; head three times and a half in the same ; the lower jaw is longer than the upper one, and when the mouth is shut the opening is upwards ; snout very short ; maxillary very large and extending further than the anterior margin of the eye ; this is large and only contained twice and a half in the length of the head.

Dorsal with seventeen rays ; caudal very forked ; anal low, with eighteen rays, the ventrals are inserted a little behind the pectoral ; mouth very extensible ; tongue smooth ; the serrature of the belly extends higher than the pectorals ; of a beautiful azurine blue on the back ; the rest very silvery ; head gilt ; fins of a light yellow ; the dorsal with its extremity, and a faint transverse band, black ; seen in the sun, there seems to be a longitudinal white stripe on the body, between the blue and silvery.

Sometimes seen in the Sydney market, and one specimen from the Brisbane River, sent to be by the Queensland Museum.

MURÆNESOX BAGIO.

Murænesox bagio, Kaup. *Cat. Apod.*, p. 116, pl. XIV, fig. 73.

Ophisurus rostratus, Quoy and Gaim., *Voy. Uran.*, Zool., p. 242, pl. 51.

Conger ozyrhynchus, Eydoux and Soul., *Voy. "Bonito."* p. 203, pl. 9, fig. 2.

Congrus tricuspidatus Richard, *Voy. "Sulphur,"* p. 105, pl. 51.

Body very elongate, scaleless ; snout very much produced ; vomer with very strong, long, and compressed teeth, with more or less conspicuous lobes at the base. Of a light lilac colour with the belly white ; the dorsal yellow, bordered with black. Sometimes called "sea eel," by the fishermen ; found all over the Indian and China Seas.

MYROPHIS ? AUSTRALIS.

Posterior nostril large, situated below an arched ridge just above and on the side of the lip, with a fleshy fringe below; the other very small in front.

Head with a strong longitudinal central ridge, and on each side the arched one already mentioned; cleft of the mouth opening to the line over the half of the orbit; teeth very numerous, small, truncated in one series, except in front, where there is another equal short series; the orbit contained once and a half in the length of the snout; pectorals well developed, as is also the dorsal and anal, which are united; tail much longer than the body, and very pointed; dorsal beginning much nearer to the pectorals than to the vent.

The general colour is of a greyish brown, sometimes almost red, the body sometimes marbled with a rather darker colour; fins slaty. Inhabits the sea.

The dimensions are:—

Total length	...	...	...	...	34 inches
Body	...	...	...	...	14 "
Tail	...	...	...	...	20 "
From snout to the pectorals	...	...	...	...	4 "
Pectorals to base of dorsal	...	...	...	...	2½ "
From pectoral to vent...	...	...	...	...	9½ "

MURENA SIDEREA.

Muræna siderea, Rich. Ereb. and Terror, p. 85, pl. 48.

Head becomes very high behind the eye. Of a fine lilac colour, with rather numerous round brown spots.

Specimen eight inches long. Sydney and Moreton Bay.

CONGER ? LABIATA.

Scaleless; cleft of the mouth extending a little further than the centre of the eye, which is rather shorter than the snout; teeth numerous, fine, pointed, forming an outer line with an inner one on the side of the upper jaw, two rows on the lower; pectorals rather large; dorsal beginning slightly behind the pectorals; the two jaws about equal, the lips hanging down on each side. The body contained once and two-thirds in the length

of the tail, which is pointed; the anal and dorsal united; the posterior nostril is in front of the upper edge of the eye, the anterior smaller, and placed in front over the lip. On each side of the snout a small tentacle; the snout is projecting. Of a dark olive green on the back, with the belly and the fins of a bright yellow, with the exception of the ends of the dorsal and anal, which are black.

About twenty inches long.

SYNGNATHUS TIGRIS.

The length of the snout is shorter than the distance from the front margin of the orbit to the end of the opercle; no ridge on the side of the head; tail very long, more than once and a half the length of the head and body; base of the dorsal slightly raised above the back; no spines on the shields; upper edge of the caudal and lateral line continuous; vent placed below the middle of the dorsal fin; caudal fin well developed, two-thirds as long as the snout.

Seventeen body scutes; thirty-six caudal; dorsal high, with twenty-five rays, extending over five rings.

General colour a dark olive-green, variegated with brown on the sides; white below; on the sides of the head a few very narrow, oblique stripes of a dark reddish brown; twelve broad dark reddish bands on the body; each body scute with a white half oval spot on its lower edge.

Length twelve inches.

MONACANTHUS ATRAUDI.

Balistes atraudi, Quoy & Gaim. *Uran. Zool.*, p. 216, pl. 47, fig. 2.

Body very elongate; snout very long; dorsal spine with only two series of barbs, which are pointed backwards and downwards; ventral spine fixed, very small; skin velvety, rather rough.

Colour, grey, with generally three longitudinal brown bands; fins yellow; in very old specimens, fifteen to eighteen inches long, the colour is uniform without bands.

The small specimens of this species are very common at Port Jackson, particularly near the heads.

MONACANTHUS GRANULATUS.

Monacanthus granulatus, White, *Voy. to N. S. W.*, p. 295, pl. 39.

Gunther Cat. vol. VIII., p. 243.

granulatus? Richard. *Ereb. & Terror, fishes*, p. 63, pl. 40.

Ventral spine present, enclosed in the pelvic bone; dorsal spine with only two series of barbs pointed backwards and downwards; body covered with minute papillæ like mushrooms; the ventral fin very fully developed.

Of a brownish grey, marbled with dark brown, with the papillæ white; fins olive yellow sprinkled with brown; generally two large dark spots at the base of the anal on the belly.

N.B.—Certainly different from my *margaritifera*, but having the same form; Richardson's species is I believe the latter, as the plate represents the dorsal spines barbed on both sides.

MONACANTHUS MEGALURUS.

Monacanthus megalurus, Richard. *Io. Pisc.* p. 109, pl. 8.

chinensis, Richard. *Ereb. & Terror, fishes*, p. 64, pl. 40.

Body elevated; snout pointed; dorsal with only two series of barbs, which are pointed backwards and downwards; anal fin with thirty or thirty-one rays; ventral spine moveable, without spinelets; some old males with the upper caudal ray produced.

Brown; ventral expansion of a livid grey with its extremity black; dorsal of a dusky brown with its external half yellow; extremity of the caudal and anal black.

Obtained in April.

MONACANTHUS PERONII.

Monacanthus Peronii, *Hollard, Ann. Sc. Nat.* 1854; vol. II., p. 356, pl. 13, fig. 4.

Anal fin with thirty-three spines; the dorsal with four edges, equidistant, and armed with barbs; body covered with papillæ having rather the form of small mushrooms; four curved spines on the tail.

Brown with the lower parts grey; along the back and the base of the anal are seen irregular narrow lines of a most beautiful

azure blue; the space where the caudal spine and the base of the caudal fin are, of a brownish red; the other fins yellow, sometimes rather orange.

Several specimens procured in April and May.

MONACANTHUS HIPPOCREPIS.

Monacanthus hippocrepis, Quoy and Gaim., *Voy. Uranie*, Zool., p. 212.

Aleuterius variabilis, Richard, *Ereb., and Terror, fishes*, p. 67, pl. 53, fig. 1.

Anal fin with less than forty rays; (35) dorsal spine with four series of barbs, the front series very close together; skin velvety; generally four and sometimes six strong spines directed forward.

Brown, with some reticulated lines of a darker colour, on the back; on the head oblique black stripes, which become of a fine blue when near the eyes; on the upper part of the head the colour becomes yellow, with the stripes purple; on each side of the body there is a large yellow patch marbled with brown; on the tail there is a flesh-coloured patch, on which are the spines; caudal fin grey, with a transverse crescent of a fine brown; dorsal, a brilliant yellow with its base brown; the other fins of a fine yellow.

Rather plentiful in the warm months; usual size about thirteen inches long.

In May I obtained a female specimen, with rather dull colouring and without caudal spines; the upper profile of the snout is straight.

MONACANTHUS RUDIS.

Monacanthus rudis, Richard, *Ereb. and Terror, fishes*, p. 65, pl. 40, fig. 7.

Div. Anal fin with less than forty rays; dorsal spine with four series of barbs; the front series being much closer together than the back.

Form oblong; anterior profile of the head rather concave; body covered with short spinelets, having each three or four points, which become smaller, and more crowded on the head and tail; ventral spine very small, not moveable; the dorsal

spine as long as the space from the snout to the anterior edge of the orbit; the barbs of its posterior edge moderate, directed downwards; those of the anterior very small, only visible on the superior half of the spine, and the two series only separated by a longitudinal sulcate; this dorsal spine is inserted over the anterior third of the orbit; the second dorsal has thirty-eight rays; the caudal is rounded; anal with thirty-five rays.

Of a greyish yellow becoming brown on the back; belly of a dirty white; fins of a bright yellow; the posterior half of the caudal of a dark colour.

The specimen is over ten inches long, it bears no trace of spines on the tail; obtained in October.

Dr. Gunther places *rudis* with those species having only two series of barbs on the dorsal spine; but I believe there is no doubt that this is Richardson's species; these anterior barbs are small, and are perhaps missing in some specimens; the specimen I described under this name, *Proceed. Zool. Soc. of Vict.*, Vol. II, p. 54, does not belong to this species, and is probably *Freycineti* of Hollard.

MONACANTHUS PRASINUS.

Monacanthus prasinus, *Cast.*, *Proceed. Zool. Soc. Vict.*, Vol. I., p. 205.

Small specimen, similar to those from Victoria, but with the lower part of the body of a silvery white; procured in June.

ARACANA LENTICULARIS.

Aracana lenticularis, *Gunth. Cat. Vol. VIII.*, p. 268.

Ostracion lenticularis, *Richard.*, *P.Z.S.*, 1841, p. 21.

Of a lilac pink, with yellow reflections; on the sides and back some spots of an ochreous-yellow, having the centre darker; lower parts of the body and mouth of a rose colour, becoming darker towards their extremities.

TETRODON LUNARIS.

Tetrodon lunaris, *Bloch. Schneid.*, p. 505.

var. spadiceus, *Richard. Sulphur. Fish.*, p. 123, pl. 58.

Enters Dr. Gunther's division; "back lower, not compressed;

nasal openings two on each side, opposite each other, and placed on a single, more or less prominent papilla; a distinct fold along the lower part of the body and tail;" forming the genus *Gastrophysus*, of Muller; upper parts covered with small spines beginning rather in front of the eyes, and extending to the base of the dorsal; others cover the belly, but no transverse lines of these spines join one another on these parts; the head is quadrangular, and is more than the distance between its posterior extremity and the base of the dorsal; caudal forked; tail slightly compressed and naked; anterior part of the head elevated; cheeks entirely smooth, with a line forming an angle in front, and another below the eye; the upper parts are brown; the sides of the head silvery; the fins yellow; no defined silvery bands on the sides.

The specimen is eight and a half inches long, and is from Moreton Bay; it belongs to the Brisbane Museum.

The length of the head is more considerable than is said in Dr. Gunther's description; this fish certainly belongs to Richardson's *spadiceus* from the Chinese and Indian Seas, and may be different to the typical *lunaris*.

TETRODON AMABILIS

Nasal organ very conspicuous, simple, without any fringe or tentacles; no fold along the lower part of the tail; body covered with short villiform spines; dilated belly, covered with rather spaced tubercles; eight dorsal rays, the body is entirely of a dark reddish brown; the belly of a fine orange colour; this is covered with numerous broad, black, concentric stripes; the fins are of a bright yellow; the caudal is orange with numerous black spots, forming several irregular transverse bands; the anterior profile of the head is concave; it becomes very convex over the eyes, and runs nearly straight along the back.

The only specimen (taken on the 20th July, 1877) I have seen of this pretty fish is four and a half inches long.

DIODON NOVEMMACULATUS?

Diodon novemmaculatus? Cuv. *memoires du museum*, vol. VII
maculatus? Gunth. *Cat.* vol. VIII., p. 307.

Atopomycterus Bocagei, Steind. *Sitzb. Ak.* 1866, p. 477, pl. 6, fig. 3.

Grey colour; body covered with small round black spots, forming several transverse black transversal bands, one below the eye, one in front of the pectorals, and the third behind these; fins of a fine bright yellow; the front of the head is covered with five longitudinal dark lines.

NOTE.—The nasal tentacles are bifid. Like Steindachner, I cannot see any nasal openings. It is certain that this is the species mentioned by that author.

CONTRIBUTIONS TO THE ZOOLOGY OF NEW GUINEA.

PART III.

Description of a *new marsupial* allied to the genus *PERAMELES*, *Geoff.*

By E. P. RAMSAY, F.L.S., C.M.Z.S., Cor. Memb. Royal Soc., Tasmania; &c.

PERAMELES BROADBENTII, *sp. nov.*

Pl. 27.

In. $\frac{4-4}{1-3}$; can. $\frac{1-1}{1-1}$; premol. $\frac{2-2}{1-3}$; mol. $\frac{4-4}{1-4}$.

Mr. Kendall Broadbent was fortunate enough to obtain a single specimen of this fine species, at a considerable distance inland from Port Moresby, in some of the dense mountain scrubs on the banks of the Goldie River. It is, without doubt, the largest species of the genus yet made known, and, although departing somewhat from *Perameles* proper (chiefly in the form of the skull and tail), I prefer, for the present, to keep it in this genus, than to create a new one for its reception. The tail, in which only a few of the vertebræ at the tip have been left, appears to have been, to some extent, prehensile, and, in its peculiar scaly under surface, differs from that of any other species of the genus (*Perameles*).

The hair is comparatively smooth, not so harsh to the touch as in *P. nasuta*; some of the longer black hairs are slightly flattened, stiff, but not spiny, the longest about an inch in length; the under fur is soft and wavy.

The general color is of a blackish brown; the throat, sides, and all the under surface and fore legs, fawn color, a little brighter on

the sides and chest. The head above is of an ashy tint pencilled with blackish hairs; the hairs on the back are dark brown tipped with fawn, and mixed with them are longer hairs of a jet black color slightly stiffer than the rest; the feet are clothed with very short, light brown, or fawn-coloured hair; the hands almost naked; no hair on the fingers; the toes and hind feet are covered with similar short light fawn-coloured hair; there are also a few long straggling hairs on the chest, throat, and under side of the arms of the same colour; the bristles on the snout are long and black. The ears blackish without, light fawn-colour within, almost naked, sparingly clothed with minute fawn-coloured hairs; they are rather small for the size of the animal; the inner margin is rounded at the base, the outer rather straight to the tips, which are slightly rounded; in the hollow of the ear are two transverse naked parallel folds with a narrow deep fissure between them (fig 2 and 8). Palate with eight transverse ridges; on the outer margin near the base a well defined lateral fold. Feet roughened below with flattish scales. Tail about one-third the length of the body, scaly above, covered with transverse flattish scaly tubercles below, to the very tip, blackish above for about two-thirds of its length, from thence fawn-color to the tip, sparingly clothed with short hair. The snout naked and marked with parallel longitudinal lines at the tip; the median fissure distinct.

Nails on three fingers only; first and fifth finger almost rudimentary, and without nails; on the second and third the nails are well developed, long, pointed, of a light horn color, with the base black. Nails of the hind feet on four toes, horn color, darker at the base, rather short, thick, and strong; those on the conjoined toes curved, and diverging.

Teeth. Incisors $\frac{4-5}{1-3}$, canines $\frac{1-1}{1-1}$, premolars $\frac{3-3}{1-3}$, molars $\frac{4-4}{1-4}$. The third incisor of the lower jaw very much hooked laterally. (Fig. 6, i.)

The last of the premolars, and the third of the molars, are the largest in both jaws. The canines are comparatively small and much worn down.

Measurements from skin preserved in spirits. Adult male:—

Total length from anus to tip of snout, 20 inches; with the tail, 27·9; circumference of tail at base, 1·6; at half an inch from the tip, 0·7; length of hand, 2·1; of the foot, 3·9; radius, 2·9; tibia from malleolus, 4·4; from tip of snout to base of the ear, 4·5; from tip of snout to eye, 2·5.

Skull. Length, 4·5 inches; across zygomatic arches posteriorly 1·7; anteriorly, 1·4; breadth at the base of posterior limb of zygomatic arch, 1·2 in.; breadth opposite centre of arch, 0·55 in.; greatest width between orbit, 0·8 in. Occipital crest very prominent, deeply concave and expanding behind laterally; greatest width posteriorly, 1·2 in.; occipital foramen, height 0·4 in.; greatest width, 0·5 in.; auditory bullæ small (apparently broken away). Nasal bones: length, 2·02 inches, width anteriorly, 0·25, width behind, 0·3. Length of zygomatic arch outside, 1·7; inside, 1·25; width of zygomatic arch inside, 0·5. Height of skull from upper margin of *foramen magnum* to vertex, 0·85; greatest width behind, 1·2; length of anterior palatal suture, 0·4; posterior ditto, 0·5 × 0·2; distance from incisor tooth to posterior margin of the palate, 2·55; distance from 1st incisors to posterior margin of canine, 0·8; to the anterior margin of canine, 0·6; width of canine, 0·2; distance from anterior margin of incisor to posterior margin of last molar, 2·35; from anterior margin of 1st premolar to the posterior margin of 3rd, 0·72; distance from 1st incisor to posterior margin of 5th, 0·5; distance between 5th incisor and canine, 0·09; between canine and 1st premolar, 0·15; between 1st and 2nd premolar, 0·1; between 2nd and 3rd premolars, 0·05; width of 3rd premolar, 0·2; whole range of the premolars, 0·75; range of the four molars, 0·7; width of the canine at base, 0·2; height of the canine, 0·2.

The very exact and carefully drawn figures, so kindly sketched for me by my friend Baron Miklouho Maclay, will give a better idea of the parts than a verbal description.

EXPLANATION OF PLATE.

All the figures (with the exception of fig. 1) are of the natural size.

Fig. 1.—*Perameles broadbentii*, Rams. Ad. ♂ from a photograph of the stuffed specimen in the Australian Museum, Sydney; about one-ninth of the natural size.

Fig. 2.—Head of the same, in profile, from a skin preserved in spirits. The long bristles of the face were somewhat broken at the point, and, on that account, somewhat shorter than in the living state. (After the process of stuffing and drying the length of these hairs is still further reduced).

Fig. 3. End of the snout *from above*.

Fig. 4. End of the head (nose and mouth) *from below*.

Figs. 5, 6, 7. Before the specimen was stuffed the skull was taken out, and replaced by a plaster cast, in order that it might be available for further investigation and comparison. † It has thus become possible to give a correct drawing of the jaws, with the teeth in situ, and of the hard palate, with the characteristic transverse ridges.

Fig. 5. Both jaws in profile.

i. Incisors $\frac{3}{4}$

c. Canines $\frac{1}{4}$

p. Premolars $\frac{3}{4}$

m. Molars $\frac{3}{4}$

Fig. 6. Lower jaw, from above.

Fig. 7. Upper jaw, from below, shewing the characteristic palatal ridges.

Fig. 8. Inner surface of the pinna, somewhat extended by the aid of needles, in order to render visible the two transverse folds.

Fig. 9. Extremity of the tail, from the spirit specimen; the upper surface hairy, the lower with thick transverse epidermal scales.

Figs. 10, 11, 12. Anterior extremity.

Fig. 10. From above.

„ 11. „ the side.

„ 12. „ below.

Figs. 13, 14, 15. Posterior extremity, from above, from the side, and from below.

The small numbers indicate the fingers and toes.

† Baron Macleay has kindly undertaken to give, in a future paper, some anatomical details, with remarks on the comparative anatomy of the skull, &c.

EXHIBITS.

By E. P. Ramsay, Esq., F.L.S., &c.:—*Perameles Broadbentii*, from Port Moresby, New Guinea. Mounted specimen. And White Ants (*Termes*), probably a new species, obtained from a Blue Gum tree, near Sydney.

By Mr. Brazier:—A new species of *Conus* and a new species of *Mitra*. A specimen of *Obsidian* (?), full of spherical cavities, which, when placed on the fire, had exploded with much violence.

MONDAY, DECEMBER 30, 1878.

W. J. STEPHENS, Esq., M.A., the President, in the Chair.

VISITOR.

W. A. HASWELL, Esq., M.A., B. Sc. of Edinburgh, was introduced to the meeting by the Chairman.

DONATIONS.

Proceedings of the Zoological and Acclimatisation Society of Victoria, Vol. V., for 1878. From the Society.

PAPERS READ.

Notes on PUFFINUS (*Nectris*) CARNEIPES, *Gould*, Handbk. Bds. Aust., Vol. II., p. 465.

By E. P. RAMSAY, F.L.S.

This species of Puffin represents on the N.S.W. coast the *Nectris brevicaudus*, of South Australia, and is as numerous in certain places as that species is there.

Among other places they frequent the Solitary Islands, in great numbers during the breeding season which lasts from September till December. Through the kindness of James Barnett, Esq., the Colonial Architect, I have received from Messrs. MacLeod, Jennings & Murray, a fine series of these birds and their eggs.

The birds arrived early in September, and at once betook themselves to excavating their nesting-holes, which are short

burrows in the ground, about 6 inches in diameter and 12 to 20 inches in length, in no instance was more than one egg obtained in a burrow; the males and females assist in incubation; out of five specimens of birds taken from the burrows 4 proved to be females. There is no difference in the plumage of the sexes. The eggs are apparently laid at night; the birds arrive in countless numbers in the evening and most of them, the males probably, or those not engaged in hatching, return to the sea at daylight in the morning. As many as 20 dozen eggs have been taken on a single morning, the workmen at the lighthouse finding them a very delicious article of food. Their average weight is 2 oz.; the lightest and smallest sent me weighed 1.5 oz. They are usually of an oval form, 2.4 inches in length by 1.6 inch breadth, of a pure white color and of a smooth fine grain. One specimen sent to me by Mr. MacLeod, is more pointed at the thin end, and has very light brown irregular blotches on the thicker end; the shell is slightly different in texture and may belong to a species of Tern, nevertheless it was obtained in one of the Puffin's burrows.

MEASUREMENTS OF EGGS.

No.	Length.	Breadth.	
1.	2.4	1.6	laid Dec. 5th, 1878.
2.	2.4	1.6	" " "
3.	2.35	1.5	taken Dec. 5th "
4.	2.25	1.54	laid Dec. 10th "
5.	2.47	1.57	" " "
1a.	2.45	1.63	laid Nov. 25th "
2a.	2.33	1.7	" " "

Specimens of the birds sent to me alive have the irides blackish brown, legs and feet pale flesh color, bill dark brown above lighter below.

Total length	♂ 17 inches	♀ 16.5
Wing	" 11.3	" 11.4
Tail	" 5.2	" 5.4
Tarsus	" 1.85	" 1.85
Mid-toe and nail	" 2.3	" 2.3
Bill from forehead feathers	" 1.4	" 1.4
Culmen	" 1.6	" 1.6
Bill from nostril	" 1.1	" 1.05
Bill from gape	" 2	" 1.15
From nasal tube to forehead	" 0.45	" 0.45

Hab. The whole of the East Coast as far north as Torres Straits.

The specimens and eggs described are from the South Solitary a rocky island near Port Stephens.

On two new species of Crabs, of the genus *STENORHYNCHUS*.

By WILLIAM A. HASWELL, M.A., B. Sc.

The genus *Stenorhynchus* of Latreille was for a long time regarded as being restricted in its range to European seas. More recently, however, two species have been described from the southern hemisphere—one, *S. falcifer*, by Stimpson from the Cape of Good Hope, and the other *S. curvirostris*, by Dr. A. Milne-Edwards* from Bass's Straits.

1.—*STENORHYNCHUS BREVIROSTRIS*, *sp. nov.*

Gastric region of the carapace with five tubercles, of which four are situated anteriorly in a transverse line and very small, while the fifth is much larger and situated in the middle line close to the posterior border of the region. Cardiac region with three tubercles, the two anterior being close together in the same transverse line, and very large; the third small, situated close behind them. Two obscure tubercles on the lateral hepatic regions, and three on the branchial. Lateral margins with two prominent triangular teeth. Rostrum short, of two bluntish teeth which do not reach further forward than the distal extremity of the second joint of the external antennæ, the furrow between them not extending so far back as the line joining the posterior borders of the orbits. No infra-orbital spine; upper boundary of the orbit very prominent, but without a supra-orbital spine. Eyes with a slight tuberosity on the anterior surface of their peduncle, and a small conical projection on the anterior and superior aspect of their distal extremity. Antennæ and maxillipedes very similar to those of *S. phalangium*. Epistome with a slight tubercle on each side near the auditory organ. Anterior limbs equalling in length about two-and-a-half times the breadth of the carapace; arm in

* Description de quelques Crustacés nouveaux ou peu connus, Journal des Museum Godeffroy, Band I., p. 77.

the female smooth internally and externally, with a row of fine teeth on its superior surface; hand compressed and carinated externally; arm, wrist and hand in the male all much dilated; the first with three or four small teeth on its superior margin; the last not carinated externally; fingers in both sexes compressed, curved inwards, furrowed externally, finely denticulated on their inner borders, which meet throughout their entire extent. Second pair of legs equalling in length eight times the breadth of the carapace.

All the male specimens I have obtained are smaller than the female, and have the carapace less convex and almost smooth.

Locality, Port Jackson, at depths of about five to eight fathoms.

2.—*STENONRHYNCHUS FISSIFRONS*, *sp. nov.*

Carapace having a blunt spine and two tubercles on the gastric region, placed in the form of a triangle, with the base forwards, and the apex formed by the spine; one prominent blunt spine on the cardiac region, and three tubercles on each branchial region; a blunt, sub-bifid spine on the lateral border of the carapace, and two small acute teeth situated below and behind it. Rostrum as in preceding species, but the furrow separating the two halves extending as far back as the line joining the posterior borders of the orbits; superior border of the orbit armed with a prominent acute spine. Eyes, antennæ, and maxillipedes as in preceding species. Anterior limbs (in the female) much compressed; arm with three small acute teeth on its outer surface; wrist with two tubercles on its outer surface and two small teeth on its inferior border; hand with a row of short acute spines on its superior and inferior borders; its inner surface smooth; the middle of its outer surface obscurely tuberculated.

The above description is from a single specimen—a female—in Mr. Macleay's collection, from Auckland, New Zealand.

Notes on the ANATOMY OF BIRDS. 1.—The Brachial Plexus of Birds. By WILLIAM A. HASWELL, M.A., B. Sc.

The anatomy of the Brachial Plexus of Nerves in the Class Aves has been described by various authors (e. g., Cuvier,

Leçons d'Anatomie Comparée, tom. 2, p. 266; the author of the article "Birds" in *Rees' Cyclopædia*; Owen in the article "Aves" in *Todd's Cyclopædia*, and in his *Anatomy and Physiology of the Vertebrata*, Vol. II, p. 125), but in all cases somewhat briefly and unsatisfactorily, and with not a few omissions of important points.

The Brachial Plexus consists in Aves of the whole of, or of branches from, the anterior primary divisions of from three (*Todirhamphus sanctus*, *Myzantha garrula*), to five (*Phalacrocorax Novæ-Hollandæ*, *Grallina picata*) spinal nerves, four being the commonest number. The most general arrangement of the plexus and its branches is as follows:—

The first nerve before joining with any of the others detaches a considerable branch, which subdivides for the supply of the rhomboid and trapezius muscles. The second nerve also gives off a branch before joining the plexus; this is a slender twig which runs directly backwards over the posterior nerves of the plexus to supply the serrati muscles; it is thus analogous to the "nerve of Bell" of human anatomy. The second nerve of the plexus divides into two; the anterior of the two divisions is joined by the first nerve to form the *posterior brachial nerve* (*circumflex* and *musculo-spiral*); the posterior division joins with the remaining two or three nerves to form the *anterior brachial nerve* (*ulnar, median, and musculo-cutaneous*). There are thus formed two main nervous trunks, which, while in the neighbourhood of the axilla, give off a number of muscular branches. The *posterior brachial nerve* gives branches to the subclavius, ⁽¹⁾ coraco-brachialis brevis, ⁽²⁾ and subscapularis, ⁽³⁾ to the teres major, ⁽⁴⁾ and latissimus dorsi. The *anterior brachial nerve* gives origin to two large branches for the pectoralis major, one for the coraco-brachialis longus, ⁽⁵⁾ and to a small branch, which sometimes originates from one of the branches to the pec-

(1) *Subclavius* of Rolleston; *pectoralis secundus* of authors. The nerve for this muscle sometimes arises from the first nerve of the plexus directly.

(2) *Deltoides minor* of Tiedemann.

(3) *Levator humeri* of Tiedemann.

(4) *Infraspinatus* of Meckel.

(5) *Pectoralis minimus* of Tiedemann; *subclavius* of Retzius.

toralis, destined for the deltoideus minor. The *internal cutaneous nerve* also arises in part from this cord, but its mode of origin presents considerable varieties in different birds. It arises almost always by two roots, which may be both derived from the anterior brachial nerve, or one from the anterior brachial nerve, and the other directly from the spinal nerve following the last of those entering into the formation of the plexus. When the former is the arrangement observed, the anterior brachial nerve is usually joined near its origin by a branch of very small size from the spinal nerve immediately following those which go to make up the great bulk of its fibres, and the spinal nerve from which this slender branch is derived is evidently the equivalent of that from which arises the posterior root of the internal cutaneous, when the last described arrangement holds good; since in this case the anterior brachial nerve is not joined by any such small accessory root. The spinal nerve which thus so generally assists either directly or indirectly in the formation of the internal cutaneous, seems to be the analogue of the third dorsal nerve of mammals; and this view is strengthened by the fact that in cases in which it gives off no branch to contribute to the formation of the internal cutaneous, it gives off an intercosto-humeral branch for the nerve-supply of the skin of the upper arm. The two roots of the internal cutaneous nerve join one another about the middle of the upper arm, and the single nerve thus formed courses to the ventral surface of the fore-arm, where it divides into two main branches, which are traceable, giving off numerous branchlets, in the subcutaneous tissue as far as the wrist.

The above may be regarded as the simplest arrangement of the plexus. In many cases, however,—*e.g.*, *Columba ænas*, *Leucosarcia picata*, *Phalacrocorax Novæ-Hollandiæ*—the connexions of the nerves are more complex.

As regards the distribution of the main trunks, the *posterior brachial nerve* passes from the axilla to the posterior surface of the arm, where it gives off near the head of the humerus a large *circumflex* branch, which divides for the supply of the deltoideus major, the tensor major and the humero-scapular joint. The main part of the nerve, after giving off branches to the triceps, and,

further down the arm, a strong cutaneous branch (*external cutaneous of musculo-spiral*) for the supply of the anterior alar fold, reaches the forearm and gives a muscular branch to the extensor carpi radialis longior and extensor metacarpi radialis.* It then divides into three branches; of these that situated nearest the radial side courses to the hand in contact with the extensor longus pollicis and extensor indicis, gives off a branch to the interossei muscles, one to the extensor brevis pollicis and one to the adductor manus, and ends in cutaneous nerves for the supply of the dorsal surface of the three digits. The middle division gives a twig to the anconeus, and ends in two branches, one of which supplies the extensor communis digitorum, and the other goes to supply the skin on the ulnar side of the manus; the last, or most ulnar, of the three divisions divides into two branches—one supplying the extensor carpi ulnaris, and the other the skin on the ulnar border of the forearm.

The *anterior brachial nerve*, after giving a branch to the biceps, and a cutaneous twig to the skin covering the upper part of the arm, runs down the inner surface of the arm to the hollow in front of the elbow-joint, near which it gives off a cutaneous nerve (*external cutaneous of musculo-cutaneous*) to the skin of the radial side of the forearm, and a muscular branch to the brachialis anticus muscle; it then divides into two trunks. The first of these, passing to the radial border of the forearm, gives off two small cutaneous twigs, and a branch which supplies the flexor muscle carpi ulnaris, and divides into two branches, one of which runs along the ulnar border of the flexor carpi ulnaris to the hand, where it supplies the adductor manus and becomes cutaneous on the third digit; while the other passes under the flexor carpi ulnaris to the deep surface of the flexor sublimis digitorum, the tendon of which it accompanies to the hand, where it ends in two small superficial branches.

The second of the two main trunks of the *anterior brachial (median)* divides into three branches; one of these supplies the pronator muscles; another passes under the pronators and supplies the flexor profundus digitorum; while the third and

* *Extensor metacarpi longus*, of Tiedemann; *abductor pollicis longus*, of Rüdinger.

largest runs to the hand, where it divides into two branches, of which one supplies the flexor brevis pollicis and adductor pollicis, and becomes cutaneous on the pollex; while the other supplies the flexor brevis indicis (fourth interosseus) muscle, and becomes cutaneous on the second digit.

EXHIBITS.

Mr. Masters exhibited a *Phyllosoma* (new species) from Port Jackson; and a number of the young of *Trachurus trachurus*, which had been found sheltered under a medusa.

Dr. Cox exhibited a complex piece of Wood Carving from the Solomon Islands, which appeared to represent a grotesque combination of various forms.

NOTICES.

The President announced that the Annual Meeting would be held on Wednesday, January 22nd, in accordance with arrangements made by the Council of the Society.

Mr. Macleay stated that it had been suggested that the Monthly Meetings of the Society should be, in future, held on the last Wednesday night in each month, instead of the Monday night, as at present. The matter would be arranged at the next Council Meeting.

ANNUAL GENERAL MEETING.

JANUARY, 1879.

W. J. STEPHENS, ESQ., M.A., PRESIDENT, in the Chair.

The PRESIDENT delivered the following address:—

GENTLEMEN,—The day has now returned when it becomes by custom the duty of the President to lay before the Members of this Society an abstract of our own operations during the past year, of those of kindred associations here or elsewhere in Australia, and of such late discoveries or publications as may appear of special interest to Naturalists in this portion of the Globe. But, as a preliminary, I desire to make use of this opportunity to draw your attention, and that of the public, to the remarkable prosperity of the Society, not indeed, I regret to say, in a financial, but in a scientific point of view. Since the first monthly meeting, held on Monday, January 25, 1875, there have been read more than 150 original papers, or portions of papers, on various subjects, all of which have been printed, with the exception of a few still in hand to complete the third volume of Transactions. And yet, while this activity in writing and publication is not only maintained but increasing, we have to deplore a rapid and serious diminution in the number of our subscribers. The reduction of the funds available for printing will require the particular attention of the still faithful members, in order that our deserters may be recovered, or their places filled by new recruits; as the Society cannot otherwise maintain that practice of early and regular publication which has characterised it hitherto. We have not as yet applied for any assistance from the Government, although it will be, I think, admitted that we have reasonable ground for such an application, in order that our funds available for printing may be supplemented by a small annual grant, in proportion either to the amount of subscriptions, or, which might be preferable, to our actual expenditure upon this object.

It is needless to observe that such a zoological station as has been proposed here by our distinguished associate, Baron de Miklucho Maklay, would involve a series of expenses which it would be absurd to suppose within the means of our Society. For this purpose, therefore, when our plans are matured, the assistance of the State must be requested. And it appears to me that the present conjuncture of affairs suggests the establishment of such a station for research, in conjunction with an aquarium for popular instruction and amusement, as a portion of the constructions now commenced for the New South Wales International Exhibition. I am sure that no portion of the display would attract more attention than the opportunities thus afforded to ourselves and to strangers for observing the forms and habits of the little-known creatures which throng our sea margins—fish, crustaceans, molluscs, echinoderms, corals, and innumerable other animal and vegetable organisms. Few in this country have ever had the good fortune to “gaze upon the secrets of the deep” in such establishments as are found in Brighton, Westminster, and many other British towns; at Naples, or the Texel, on the continent of Europe; and, if not elsewhere, in Newport, U.S.A., under the hospitable superintendence of Professor A. Agassiz. And there are few places in the world in which the requisite buildings could be placed with such advantage for the supply of all conceivable forms of marine life, in order to their exhibition to a large city population, as in Sydney. The position of the establishment, if combined with aquaria open to the public, must evidently be somewhere on the borders of Farm Cove, in or near the sea fringe of the Botanic Gardens. From the old quarry in the grounds of Government House on the west to near Garden Point on the east, there is no ground which would not serve for the purpose, or in which a well-designed structure would not be ornamental. But for various reasons, the eastern corner, beyond the present enclosures, offers the finest position. If, to use a vulgar phrase, it had been made on purpose, it could not be better adapted for the purpose.

Though such an institution is beyond the means and, in part, even outside the scope of this Society, it is so entirely in

accordance with our object, that I venture to express a hope that Members may lend the assistance of at least their personal influence to its speedy commencement and completion.

The Papers read before the Linnean Society of New South Wales during 1878, have been as follows, according to the order of their succession :—

1. Description of a new species of *Ptilotis* from Torres Straits. By E. P. Ramsay, F.L.S.
2. On an Australian variety of *Neritina pulligera*, Linn. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
3. On a new genus of *Milleporidæ*. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
4. On a new species of *Psammoseris*. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
5. Description of a species of *Myiolestes* from Fiji. By E. P. Ramsay, F.L.S.
6. Notes on a species of *Therapon* found in a dam at Warialda. By William Macleay, F.L.S., with Remarks by the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
7. On a new species of *Desmophyllum*, and a young stage of *Oycloseris Sinensis*. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
8. On the Geology of Yass Plains. By Charles Jenkins, Esq., L.S., Yass.
9. Description of some new Fishes from Port Jackson and King George's Sound. By William Macleay, F.L.S.
10. Notes on List of Australian Birds. By E. P. Ramsay, F.L.S.
11. Notes on the Fishes of the Norman River. By Count F. de Castelnau.
12. On a new species of *Hoplocephalus* from Sutton Forest. By William Macleay, F.L.S.
13. On the Power of Locomotion in the *Tunicata*. By William Macleay, F.L.S.
14. On some Australian *Littorinidæ*. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
15. Descriptions of five species of Birds from Torres Straits and New Guinea, &c. By E. P. Ramsay, F.L.S.

16. Descriptions of seven new species of Terrestrial and Marine Shells from Australia. By John Brazier, C.M.Z.S., &c.
17. On *Bulimus Dufrenoyi*. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
18. On three new genera and one new species of *Madreporaria* Corals. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
19. Zoology of the "Chevert;" Ornithology, Part II. By E. P. Ramsay, F.L.S., &c.
20. On two new species of *Gerygone*. By E. P. Ramsay, F.L.S., &c.
21. On the Ferns of Queensland. By F. M. Bailey, F.L.S., &c.
22. On two new species of Land Shells. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
23. On a new genus of *Polyzoa*. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
24. On some Corals from Darnley Island. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
25. On some new Extratropical Corals. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
26. On some Freshwater Shells from New Zealand. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
27. On some new Australian (chiefly freshwater) Fishes. By Count F. de Castelnau.
28. Proposed Zoological Station for Sydney. By Baron N. de Miklucho-Maclay.
29. Lepidoptera having the Antlia terminal in a teretron or borer. By R. B. Read, M.R.C.S.
30. On the Tracheæ of some Australian Ducks. By E. P. Ramsay, F.L.S., &c.
31. Mollusca of the "Chevert" Expedition. By John Brazier, C.M.Z.S., &c.
32. Drawings by Australian Aborigines. By J. C. Cox, M.D., F.L.S., &c.
33. Report on Zoological Station, &c.
34. On a new Ganoid Fish from Queensland. By Count F. de Castelnau.

35. On a species of *Amphisila* from the Palau Islands. By William Macleay, F.L.S., &c.
36. On Macrodontism. By Baron Macleay.
37. On the Goshawk of Port Moresby. By E. P. Ramsay, F.L.S., &c.
38. Descriptions of Australian *Microlepidoptera*. By Edward Meyrick, B.A.
39. On the Geology of Yass Plains. By Charles Jenkins, L.S., Yass.
40. Description of a new species of *Vivipara*. By John Brazier, C.M.Z.S., &c.
41. On some Tertiary Fossils from Muddy Creek, West Victoria. By the Rev. J. E. Tenison-Woods, F.G.S., F.L.S., &c.
42. Contributions to the Zoology of New Guinea. By E. P. Ramsay, F.L.S., &c.
43. On the *Plagiotomata* of the Pacific Ocean. By N. N. de Miclucho-Macleay, and W. Macleay, F.L.S.
44. On an apparently new species of *Penguin*. By Captain Hutton.
45. On a collection of Birds from Erromanga. By E. P. Ramsay, F.L.S., &c.
46. On a new *Rhipidura* from Lord Howes Island. By E. P. Ramsay, F.L.S., &c.
47. On six new Annelids belonging to the family *Amphinomidae*. By W. A. Haswell, M.A., Edinburgh.
48. On the Ichthyology of Port Jackson, 219 species. By Count de Castelnau.
49. E. P. Ramsay, F.L.S., &c., on a new species of *Perameles* (*P. Broadbentii*) from Port Moresby, with Osteological remarks and drawings by N. N. de Miclucho-Macleay.
50. On *Puffinus* (*Nectris*) *carnipes*, Gould. By E. P. Ramsay, F.L.S., &c.
51. On two species of *Stenorhynchus*, *S. brevirostris*, and *S. fissifrons*, and on the Brachial Plexus of Birds. By W. A. Haswell, M.A., Edinburgh.

The Society has also had the honour to elect the following distinguished Naturalists as Honorary Members, in consideration

of the valuable services rendered by them in exploring, investigating, and arranging the Natural History of Australasia :—

Professor Owen, C.B., &c.

George Bentham, F.R.S., P.L.S., &c.

Captain Hutton.

N. N. de Miklucho-Maclay.

THE ROYAL SOCIETY OF NEW SOUTH WALES, which has suffered so severe a loss in the death of its venerable Vice-President, has received the following contributions during the past year, in the order in which they are here reported. As it is the senior Scientific Society, not only of Sydney, but also of Australia, I have thought it right to enumerate all its papers without distinction of subject :—

"Timber Producing Forests of Tasmania," by Rev. J. E. Tenison-Woods, F.G.S., F.L.S.,

"A Proposed Correction to the Assumed Longitude of the Sydney Observatory," by J. Tebbutt, F.R.A.S.

"Metallurgy of Nickel and Cobalt," by W. A. Dixon, F.C.S., F.J.C., &c.

"Meteorology of the Coast of New South Wales, and the desirability of issuing storm warnings from the Observatory," by Captain Marshall Smith, of the ship "J. L. Hall."

"Storms on the Coast of New South Wales," by H. C. Russell, B.A., F.R.A.S., F.M.S.

"On Molluscan Fauna of Tasmania," and "On some new Australian Miocene Corals," by Rev. J. E. Tenison-Woods, F.L.S., F.G.S.

"The Deep Well Waters of Sydney," by W. A. Dixon, F.C.S., F.J.C., &c.

"Some Results of an Astronomical Experiment on the Blue Mountains," by H. C. Russell, B.A., F.R.A.S., F.M.S.

"The Rise and Progress of Photography," by L. W. Hart, Esq.

"Notes on Huan Island Guano," by W. A. Dixon, F.C.S., F.J.C., &c.

"Some Facts about the Great Tidal Wave, May, 1877," by J. P. Josephson, Esq.

THE ROYAL SOCIETY OF VICTORIA has been chiefly occupied by subjects in Physics, Mathematics, Chemistry, Astronomy, &c. which bear but distantly upon Natural History. Dr. James Jamieson, however, has communicated papers—

1. Upon Photographs upon the Retina.
2. On a new point of resemblance in the Respiration of Plants and Animals; and
3. On the Perception of Colour.

Papers were also read by J. Cosmo Newbery, B.Sc.—

1. On the Occurrence of Chromium in the Iron Ore of Tasmania, and
2. On the formation of Hyalite by the action of Ammonia on Infusorial Earth from Talbot.

THE MICROSCOPICAL SOCIETY OF VICTORIA, besides communications of a somewhat technical character, has had papers read on Polyzoa, by Mr. C. M. Mapleston, Mr. Goldstein, and Mr. Barnard; on Diatoms, by Mr. Goldstein, and Mr. Barnard, and Rev. J. J. Halley; on several species of Sawflies, by Mr. K. Wooster; and on various other Insects and Arachnida, by Dr. Ralph, the President, and others.

THE ZOOLOGICAL AND ACCLIMATISATION SOCIETY OF VICTORIA has issued the fifth Volume of their proceedings, including, among other matters and reports—

1. Upon the Californian Salmon and its introduction into Victoria, by Sir S. Wilson.
2. Upon the Ostriches belonging to the Society, by S. H. Officer, Esq.
3. Upon the Chinese Yam, by Sir S. Wilson.

These papers are naturally rather of an economic than scientific interest, though they also contain many curious observations in natural history.

The same volume also contains, as an Appendix, a third supplement to the "SELECT PLANTS, readily eligible for Victorian industrial culture," by the unwearied Von Müller.

THE ADELAIDE PHILOSOPHICAL SOCIETY has had the following papers read:—

Plant fragments found in the tombs and other monumental buildings of the ancient Egyptians. By Dr. Schomburgk.

The Decrease of many families of Insects, and the Increase of some in South Australia. By Otto Teffer.

The origin of Mineral Veins, with special reference to the Barossa District. By Gaviss Scoular.

Infant Mortality in South Australia. By H. H. Hayter, Government Statist, Victoria.

The Habits and Description of a new South Australian Beetle (*Melolontha destructor*). By Otto Teffer.

Australian Trigonias and their distribution. By W. T. Bednall.

Recent Australian *Marginellidæ*. By Professor Tate.

Fossil, do. do. By the same.

Whirlwinds. By Otto Teffer.

List of Minerals found in South Australia. By S. Higgs.

The Fossil Corals of Aldinga. By the Rev. J. E. Tenison-Woods.

Supplementary paper on the Correlation of the Tertiary strata of South Australia, with a list of fossils found therein. By Professor Tate.

Subterranean Water Supply in the Interior. By T. Rawlinson.

Our Climate and Infant Mortality. By Dr. S. J. Magarey.

In Queensland, a Monograph of the Indigenous Grasses is under preparation, under Official direction; and the first Volume has already been published. Numerous discoveries also of additional members of the Flora continue to be made; among which occurs a notable illustration of the still incomplete condition of our information, in the fact that two new species of *Eucalyptus* have been quite recently found within twelve miles of Brisbane. It is understood that Dr. Bancroft is engaged in an enquiry into the medical properties of many indigenous plants, including especially *Duboisia myoporoides*, R. Brown, and *D. Hepworthii*, the Pituri of the Aboriginal natives.

There are of course many notices, papers, and other publications which bear upon the Natural Histories of Australia, issuing from the Presses of Europe and America. Among the PRO-

CEEDINGS OF THE ZOOLOGICAL SOCIETY OF LONDON, the articles which more or less refer to the Australian region, are :—

On the Birds of Ternate, Amboyna, Banda, the Ré Islands, and the Aru Islands, by T. Salvadori, C.M.Z.S.

On the Birds of Cape York and the neighbouring islands, by W. A. Forbes, F.Z.S.

On the *Larinæ* or Gulls, by Howard Saunders, F.L.S., F.Z.S.

Note on the dentition of *Ouscus*, by E. R. Alston, F.L.S., F.Z.S., &c.

Descriptions of three new species of *Opisthobranchiate Mollusca* from New Zealand, by S. T. Cheeseman, F.L.S., Curator, Auckland Museum.

Notes on the *Penæidæ* in the collection of the British Museum, with descriptions of new species, by E. J. Miers, F.L.S., F.Z.S.

Additional notes on the *Cheiroptera* of Duke of York Island, and the adjacent parts of New Ireland, and New Britain, by G. E. Dobson, M.A., M.B., F.L.S., &c.

On a small collection of Birds from the Samoan Islands of the Island of Rotumah, by W. A. Forbes, F.Z.S.

Description d'une nouvelle espèce des Casoar (*Casuarinus Edwardsi*), par M. E. Oustalet.

On a new species of Finch from the Feegee Islands, by Otto Finsch, Ph.D., C.M.Z.S.

On the Fruit Pigeons of the genus *Ptilopus*, by D. G. Elliot, F.R.S.E.

List of the Butterflies collected on Eastern New Guinea and some neighbouring Islands, by Dr. Comrie, of H.M.S. Basilisk, by F. D. Godman and Osbert Salvin.

On a third collection of Birds made by the Rev. G. Brown in the Duke of York Islands, by P. L. Sclater, M.A., Ph.D., F.R.S., &c.

Descriptions of some apparently new species of Butterflies from New Ireland and New Britain, sent by the Rev. G. Brown, by F. D. Godman and O. Salvin.

Papers were also read before THE LINNEAN SOCIETY OF LONDON :—

On *Hypsiptymnodon moschatus*, Ramsay, by Prof. Owen, C.B.

On some new species of Nudibranchiate mollusca from the Eastern Seas, by Dr. Cuthbert, Collingwood.

On the development of *Filaria sanguis hominis*; and on the Mosquito considered as a nurse, by Dr. Patrick Manson.

On the Life History of *Filaria Bancroftii*, by Dr. Cobbold.

On the Geographical Distribution of the Gulls and Terns, by Mr. Howard Saunders.

Before the ENTOMOLOGICAL SOCIETY OF LONDON:—

Descriptions of new species of Hymenopterous Insects from New Zealand, by Frederick Smith.

Descriptions of eight new species, and a new genus of *Cossonidæ* from New Zealand, by D. Sharp.

On the different forms occurring in the Coleopterous family *Lycidæ*, with descriptions of new genera and species, by Charles O. Waterhouse.

Descriptions of new genera and species of *Oleridæ*, by the Rev. H. S. Gorham.

On new Coleoptera from Australia and Tasmania in the collection of the British Museum, by Mr. C. O. Waterhouse.

The ANNALS AND MAGAZINE OF NATURAL HISTORY, for the year 1878, so far as received, contain little exclusively Australian matter, though the articles are almost without exception of the highest interest. But Mr. E. L. Layard, British Consul at New Caledonia, publishes in p. 374 of Vol. I., 5th Series, Descriptions of new species of Birds, from the Island of Lifu, New Caledonia. Professor F. W. Hutton, of Otago, New Zealand, has written in the same volume, p. 407, a Paper on the number of the Cervical Vertebrae in *Dinornis*. We also observe an Emendatory Description of *Parisiphonia Clarkii*, Bk., a Hexactinellid Fossil Sponge, from N.W. Australia, by H. J. Carter, F.R.S., &c.; Descriptions of Longicorn Coleoptera, by F. P. Pescoe, F.J.S., &c.; and Descriptions of new *Gallerucinae*, by Joseph T. Baly, F.L.S.

Among the papers published by foreign Societies may be mentioned:—In the ANNALI DEL MUSEO CIVICO DI ST. NAT. DI GENOVA,

On the Insects and Birds of New Guinea, by Drs. Guestro and Salvadori respectively; and on the *Harpalida* of Australia, by Baron de Chandoir.

In the *ANNALES DE LA SOCIÉTÉ ENTOMOLOGIQUE DE BELGIQUE*, we find, A Synopsis of the genus *Paropsis*, by Dr. F. Chapuis; and A paper on New Australian Elateridæ, by M. Candeze.

The *ANNALES DE LA SOC. ENT. DE FRANCE* contain A third paper on the *Cucujidæ*, by M. Antoine Grouvelle; A description of a new *Papilio* (*P. Laglaizei*), from New Guinea, by M. A. Depuisset; On a *Coccus* living in France on an Australian Palm (*Seaforthia elegans*), by M. Jules Künnkel d' Herculeis; and A Synopsis of the Australian species of the Genera *Curis* and *Neocuris*, of the Family *Buprestidæ*, by M. Leon Fairmaire.

THE BRITISH ASSOCIATION met last year in Dublin, under the Presidency of Dr. Spottiswoode, F.R.S., &c. His inaugural address contains, besides the business matters of the Association, an original explanation and defence of new methods and doctrines in Mathematics, which is of course foreign to our purpose. I cannot, however, but quote one passage in which he observes, "Science teaches us, while ever yearning with Goethe for 'light, more light,' to concentrate our attention upon that of which our powers are capable, and contentedly to leave for future experience the solution of problems to which we can at present say neither yea nor nay." This is in effect equivalent to Virchow's cautionary advice, to which I shall hereafter advert.

In the Department of Zoology and Botany an address was delivered by Professor Flower, F.R.S., &c., President of the section, contrasting the Linnean and modern systems of Zoological classification, and containing also some suggestions as to nomenclature. The Vice-President also delivered a sort of obituary lecture on the Physiological discoveries of the late Claude Bernard, who died in February last.

In my last address I was enabled, by the courtesy of Dr. Woolls, to give some account of the seventh and concluding volume of the *Flora Australiensis*, which had not then been published, but which is now in our hands. This great work, which has been some sixteen years in progress, was commenced

by Mr. G. Bentham, F.R.S., assisted by Dr. Müeller, now Baron von Müeller, C.M.G., F.R.S., and gives a full account of all Australian plants known to the authors at the time of publication. No such general and systematic work on Australian Botany has been produced since the appearance of R. Brown's *Prodromus*, 1810. And in order that nothing of even the latest discoveries should be lost in consequence of the gradual mode of publication which was necessarily adopted, Mr. Bentham in his first issue, 1863, expressed an intention of forming a supplementary volume to contain an account of new species added to our knowledge during the progress of the work, together with a detailed examination of the relations as well as of the whole flora to that of other countries, as of its component parts to each other. But, unfortunately, owing to increasing age and infirmities Mr. Bentham finds himself unable to undertake the amount of literary and scientific labour involved in such a task, and he therefore leaves it to Baron von Müeller to complete their joint enterprise. In the preface to the last volume Mr. Bentham pays a just tribute to the earnest and unflagging exertions which Von Müeller has throughout displayed in his contributions. He also refers briefly to some ascertained facts as to the distribution of Australian plants, which are not indeed new, but have been corroborated in the course of his inquiries. I venture to summarise them thus:—The Flora of Australia is, as a whole, endemic or indigenous, that is to say, it presents quite a peculiar and unmistakable Australian type. But it is subdivided into two, Eastern and Western, Provinces, which differ almost in every detail, though their general characters are the same. Secondly: the Australian Flora has radiated to some extent into the neighbouring Malayan and Melanesian districts by various members (for example) of the Eucalypts, Epacrids, and Leafless Acacias. Thirdly: Northern Australia, from Arnheim's land eastwards, has submitted, to a certain degree, to the influence of immigration from South-eastern Asia and India. Fourthly: the Alpine flora of South-eastern Australia and Tasmania may be traced through New Zealand to the southern extremity of the American continent, and so up the chain of the Andes, which

seems to have served as a bridge by which a few species of plants from the North Temperate or sub-Arctic Zone have been introduced into this region. Lastly: The relations of the truly Australian Flora, as a whole, are rather with Southern Africa than with any other country, as indicated by agreement in orders, tribes, and genera.

Since the publication of the early volumes of the "Flora Australiensis" upwards of 500 new species have been discovered in various parts of the country, and the descriptions of these, which appear from time to time in the "Fragmenta Phytographiæ Australiæ," will form a considerable portion of the supplementary volume. The "Fragmenta" already compose ten volumes, the eleventh being now in hand. Its indefatigable author has further followed up his "Botanic Teachings" of last year by a much more elaborate work upon the "Flora of Victoria," which, when complete, will present a systematic account of all the species indigenous in that colony, and, therefore, of most of those found in New South Wales. With some few omissions, and the addition of plants from the northern parts of this colony, the same work would serve for us also. The arrangement is that of Ray.

The Baron has also published a translation of Professor Wittstein's great work, entitled "The Organic Constituents of Plants and Vegetable Substances, and their Chemical Analysis," to which he has added a valuable preface and notes. This is a work which should prepare the way for the Medical Botany of Australia, a subject which has hitherto been but little investigated. It also should lead to the analysis of those plants, such for instance as *Swainsona*, *Gastrolobium*, *Lotus*, &c., which have an evil reputation among stockowners for their poisonous effects on sheep, cattle or horses. He has also in preparation, as indeed I mentioned last year, a monograph upon the very puzzling genus *Eucalyptus*, in which he hopes (being of a sanguine temperament) to give satisfactory definitions of the species, with lithographic illustrations, several of which are already printed. Much interest attaches at the present time to the genus, in consequence of the extended cultivation in Europe and North Africa of the Tasmanian Blue Gum, *E. globulus*. It can hardly be doubted that

there will turn out to be many other species of equal economic and medicinal value, as soon as the genus shall have been generally studied and cultivated. Meanwhile, frequent reference is made in the English and Continental Press to the subject, and many inquiries for information and for seed are addressed to those persons in this country who are supposed to be in a position to give the assistance required.

A "First Book on Australian Botany" has also been published by Mr. W. B. Guilfoyle, F.L.S., C.M.R.B.S., London, Director of the Melbourne Botanic Gardens. It is intended, as the author states in his preface, to familiarise the beginner with the principal parts of plants, and their process of growth, in so simple a manner that any teacher, though previously unacquainted with the principles of botany, may find no difficulty in comprehending the lessons and explaining them upon the blackboard. The book is simple, intelligible, and practical, sufficiently illustrated, and capable of being used to great advantage within the indicated limits. No teacher, however, is worth his salt who will rest satisfied with such a modicum of botanical knowledge as may enable him to put these lessons upon the blackboard. It is also doubtful whether much beyond the Nomenclature of Forms can be taught in this way except by a competent demonstrator of Botanical structure; but the lessons will, under ordinary skill and energy, serve at least for useful practice in drawing and discrimination of plane outlines of vegetable growth, which is in itself no bad beginning.

A handbook of the plants of Tasmania has also been published during the last year by the Rev. W. W. Spicer, M.A. The list of species is very useful, as placing before the reader a synoptical view of the indigenous plants; while the glossary, with its lithographic illustrations, will be acceptable to young students of botany. The author states that "with a view of facilitating study, the descriptions are arranged on the branched or binary system, first established by the French naturalist, Lamarck (*sic*). Under this system, a series of salient characteristics is laid before the reader in pairs, the members of each pair being as nearly as possible opposed in their terms, and each giving rise to a new pair

in like manner contradictory. The choice of these contradictions being left to the reader, he selects the member which applies most nearly to his specimen, and then passes on to the next pair. It is evident that, sooner or later, the several series of characters must be exhausted, and the name of the plant arrived at. Although there is, no doubt, some convenience in this arrangement, it is open to grave objections, as not based upon natural differences, which are generally multiple, or composed of several concomitant variations, but upon single points, which may be accidental, or of little importance. Moreover, as my friend Dr. Woolls writes, "In a small genus or order, the dichotomous splitting up of characteristics is little help, as one may just as well look over short diagnoses; but to find out the species in a large genus, or a particular genus in a large order by the dichotomous method, is often beset with the danger of being led astray by the misunderstanding of any solitary characteristic. The book is, nevertheless, a valuable contribution to the botany of Tasmania, and reflects credit on the zeal and ability of the author."

I must not, while speaking thus of Elementary Scientific Teaching, omit to notice the "Physiography" of Professor Huxley, which is a course of Lectures, forming an admirable example, not indeed of a Manual, but of a Method, and is therefore to be regarded from the same point of view as other printed lectures. It is, however, published in Macmillan's series of Manuals for Students, and is, in all probability, already a Text-book in which candidates are to prepare themselves for examination. These charming sketches deserve a better fate than this abuse, and will be read with the greatest interest by all those who are free to use their reason and imagination as the prime powers of mind; and who are not under constraint or temptation to subjugate them to memory, their excellent servant but intolerable master. About one fourth of the book is occupied by geological inquiries depending mainly upon the Biological Sciences. The rest is concerned, chiefly, with Astronomical and Physical considerations.

Among local works, the publication, which, upon various grounds first attracts our attention, is the posthumous treatise by

the late Rev. W. B. Clarke, in which he recapitulates his views and controversies upon the Geology of the Sedimentary Deposits of New South Wales. This little book is illustrated with four sections and a map of a portion of the Illawarra and Hartley coal-fields, embracing, therefore, a large portion of the Hawkesbury and Waianamatta beds, and enriched by no less than twenty appendices of great interest, and some (xiv.—xvi., xviii., xx.) of the highest importance. It is a fourth edition, very much enlarged, of a small memoir published in the catalogue of the Products of New South Wales, prepared for the Paris Exhibition of 1867; and, owing to its gradual formation, and what may be termed its "concretionary structure," is not an easy writing to decipher. Mr. Clarke, beginning with the lowest sedimentaries, mentions the Pre-Silurian only to question their development in Australia, so far as is at present known, being apparently inclined to believe that the phenomena which have been supposed to indicate them are merely the result of alteration by heat, pressure, molecular movement, and other cosmical forces, to whose operations he has given the general name of "transmutation."* And no Palæontological evidence has as yet been adduced for the existence of any strata older than the Upper Silurian. Mr. C. does not, of course, assert that these rocks do not exist, but that it is impossible to determine them, without such a survey as alone can ascertain the succession of Unfossiliferous strata, except in the lucky cases in which they happen to be caught in juxtaposition. Our Palæontology, therefore, for the present, commences in the Upper Silurian epoch, when warm, shallow, and probably much divided seas surrounding, or embayed by, districts of igneous activity, occupied a large portion of the globe space of Eastern Australia. These waters swarmed with such organisms as we are accustomed to call Silurian, identical, in many cases, with well-known Northern species, and forcing upon the observer the impression (which may, it must be admitted, prove illusory) that they are upon the same Chronological as well as Biological level. It is not as yet possible to subdivide the Australian beds

* It is as well to notice that Mr. C. was in the habit of confining the use of the word *Metamorphism* to the changes which have brought the special *metamorphic* rocks of the old geology to their present condition, and substituting in the case of all more recent beds the convenient term of *Transmutation*.

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with the accuracy which has been reached in the arrangement of the Silurian and Devonian systems in Europe and America. We can only assert that there appears to be an unbroken succession, though probably in a much shallower and poorer development, of the very same forms which have been elsewhere determined. The appendices xiv.—xvi., containing De Koninck's analysis of the Silurian, Devonian, and Carboniferous fossils from New South Wales, sufficiently warrant this statement, though the geographical data are not exact enough to localise the formations precisely.*

Mr. Clarke has devoted some fifteen or sixteen pages to the history of discovery in the Devonian beds of Australia during the last dozen years, from the time (1861) when d'Archiac wrote that he could not but suspect that there must be a Devonian formation here, though it could not as yet be asserted on Palæontological evidence, to the present year, in which we have seventy-two Devonian species enumerated by De Koninck from New South Wales, and sufficient evidence of a large development of the series throughout Australia, New Caledonia, and New Zealand.

I may here also mention that the first discovery of an unmistakably Devonian fish in New South Wales is thus parenthetically recorded:—"In March, 1878, Mr. C. S. Wilkinson sent me for comparison, a specimen of fossiliferous limestone from the Murrumbidgee, not far from Yars, which contains a plate of a *Cocosteus*, of a triangular shape, studded with tubercles of the same form as those on a plate of M'Coy's *O. trigonaspis*, but somewhat different, on the whole, from his figure." S. F., p. 18.

Some fifty pages are occupied, naturally enough, by the old controversy as to the age of the New South Wales coalfields, and though full of most interesting observations and hints, are very difficult, or indeed unintelligible, to the reader who is not familiar with the history of this question. We cannot but regret that the venerable author had not here systematised his unequalled knowledge of this portion of our geology without reference to any past or present polemics. But the general conclusions at which

* In my last address I stated, on what I supposed sufficient authority, that De Koninck's work had established the accuracy of Mr. Clarke's views as to the age of our Coal. On examination I find that this is true only so far as the lower coal measures are concerned.

one arrives as to his latest views, which are nowhere distinctly formulated, and which require to be supplemented by Appendices xviii and xx (in which latter he prints with few remarks Feistmantel's arrangement of the whole series from a Manuscript Communication), are somewhat as follows. The lowest beds of the system, *e.g.*, at Port Stephens, whether to be called Devonian or Carboniferous, contain *Lepidodendron*, 2 sp., and *Cyclostigma*, 2 sp., *Sigillaria*, *Schizopteris*, and *Glossopteris primæva* (Feist.). These are succeeded by Marine beds full of Carboniferous fossils; and these again by the Lower Coal, characterised by (?) *Lepidodendron australe*, *Macrotæniopteris* sp., and *Glossopteris*, 4 sp., including *G. Browniana* and *G. primæva*. Upon this Lower Coal is deposited a series—the last, so far as we yet know for certain—of Marine beds, containing again Carboniferous forms in abundance, as seen at Stony Creek, Greta, Mount Wingen, &c. They are succeeded by the Newcastle Coal Beds, represented also in the Illawarra and Western fields, containing a Palæozoic fish, *Urosthene*s, and a flora which most geologists have regarded as Mesozoic.* Two genera—*Phyllothea* (*P. australis* and *P. racemosa*) and *Vertebraria*—represent the *Equisetum* family. The Ferns are represented by *Sphenopteris lobifolia* and *S. alata*, *Tæniopteris* sp., *Oiopteris ovata*, *Glossopteris Browniana*, *G. reticulum*, *G. oblongata*, and *Gangamopteris angustifolia*. In Cycads we have three species of *Noeggerathia*, *N. spatulata*, *N. media*, *N. elongata*, and one of *Zeugophyllites*. The conifers appear by *Brachyphyllum australe*.

Here Feistmantel, whose arrangement does not, however, quite correspond with that now quoted, intercalates the Bacchus Marsh sandstones of Victoria, related by their fossil Gangamopterids, to the Talchir group, which underlies the Damuda coal-bearing series of India, in which *Glossopteris* takes a leading position. But so far as New South Wales is concerned, the next beds ascertained are the Hawkesbury and Waianamatta rocks, which cannot be separated from each other, and which yield three

* It is possible that there occurs at this period a repetition of marine beds. At least Mr. Clarke says, p. 84:—"Between the Hawkesbury rocks and the coal there is often a series of beds belonging to the coal measures in which Palæozoic fossils are stated to have been found." Mr. Clarke was evidently doubtful as to the fact, which would, if ascertained, have triumphantly vindicated his arguments.

genera of Palæozoic Fish—*Palæoniscus*, *Myrionolepis*, and *Cleithrolepis*; the Flora, as before, presenting a relatively recent facies. Thus we have of the *Equisetaceæ*, *Phyllothea Hookeri*; of the Ferns, *Sphenopteris alata*, *Pecopteris* = *Thinnfeldia odontopteroides*, *Odontopteris*, *Gleichenia*, *Teniopteris Waianamatta*; but no *Glossopteris*. The Conifers are represented by *Echinostrobus* sp. These beds are regarded by Feistmantel (but not by Clarke) as probably Upper Triassic, while he considers the Clarence River Coal-beds to be of a still later (Jurassic) period, corresponding with certain strata in Tasmania, Victoria, and Queensland, and indicated by the presence of *Phyllothea australis*, along with these Ferns, *Sphenopteris elongata*, *Thinnfeldia odontopteroides*, *Cyclopteris cuneata*, *Teniopteris Daintreei* and *Sagenopteris Tasmanica*. With these are associated three species of *Zamites*, and other less certain or important forms. Whatever gaps there may be, and there may be very many, in the succession, the System is nevertheless braced together by the *Lepidodendra* found below and above the coal (p. 23), by the persistence of *Phyllothea australis* upwards from the Lower Coal to the Clarence beds, by *Sphenopteris alata* and *Thinnfeldia odontopteroides* found both in the Newcastle and Clarence Beds, by *Odontopteris microphylla* and *Pecopteris tenuifolia* common to the Newcastle and Waianamatta beds, by *Gangamopteris angustifolia* in the Newcastle and Bacchus Marsh beds (app. xx.), and by the general resemblance and conformity of the formations. Upon this head, that is, the Continuity of the System, Mr. Clarke had no doubts.

It is certainly very strange, if true, that an unbroken, more or less coal bearing, series of formations should extend in these regions from the Devonian to probably the Jurassic period. Yet this is the conclusion to which the evidence now under consideration seems to force us.*

The remainder of the "Sedimentary Formations" is devoted to observations upon the *Oretaceous*, *Tertiary*, *Quaternary* and Recent formations of Australia. As, however, no marine strata later than those underlying the Newcastle Coal have, as yet, been

* I must repeat that it is only by taking Appendix xx. into consideration, as being, on the whole, accepted by Mr. Clarke, that I venture to class the Clarence Beds as, in his *ultimate* opinion, possibly Jurassic. He had previously distinctly admitted that they might be not older than Mesozoic. S.F. p. 66.

shown to exist in New South Wales, and as I have proposed to confine my observations to those portions of the work which have a local interest for ourselves, I omit further reference to this portion of the subject. Mr. Clarke moreover refers to a distinguished member of this Society, the Rev. J. E. Tenison-Woods, as in his opinion, the highest authority upon this portion of Australian Geology. I must also add that I have only endeavoured to give a sketch, not so much of the Geology of the New South Wales Coal, as of the latest views entertained by our deceased pioneer. It has not been easy to ascertain them in all points exactly; though a few minutes' conversation, now unhappily impossible, might have removed some apparent difficulties, as, for example, what he really had come to regard as the right place of the Clarence Beds.* And though it may be true that opinions, as such, on Scientific subjects, are not worthy of record, yet the experienced and veteran observer often attains to so intuitive a perception of his subject, that even his unargued dicta are to be received with respect and consideration.

A well-constructed map of the Western Gold-fields, by Mr. C. S. Wilkinson, F.G.S., has been issued during the past year under the direction of the Department of Mines. It shows the geology of Hartley, Bowenfels, Wallerawang, and Rydal, and the relations of the Upper and Lower Carboniferous, Devonian, and, in part, Upper Silurian formations, together with Granite, &c., in that part of the County of Cook which surrounds the western railway from Hartley Vale to the county of Roxburgh. Mr. Clarke has borne testimony to the general accuracy of the details, and the carefulness with which they have been expressed. Another geological map, of the Oberon Mining District, has been published by the same author, in the last Annual Report of the Department of Mines, which also contains a reduced copy of the first. It is to be hoped that these are but the forerunners of a series of authorita-

* The difficulties which have hitherto obscured this subject, arising from the absence of well marked marine formations above the Newcastle beds, are now in process of solution by the exploration and investigation of the rich fossiliferous strata of New Zealand, which are probably contemporaneous with our Upper Coal. It is in that country that the key is to be found; and Dr. Hector is sanguine that he has it in his possession. But I do not venture from such fragmentary knowledge as I have obtained of his discoveries, to anticipate the detailed account which he has laid before the Institute, but which has not yet reached Sydney. It will certainly be received with the greatest interest.

tive Local Maps, which may, in advance of a systematic survey, supply inquirers with such information as to the geology of each district, as we have hitherto principally obtained from the observations and industry of individuals.

Sir C. Wyville Thomson's first instalment of the voyage of the Challenger, though it does not bring her into our waters, is, as might be expected from so ingenious a hand, full of fascinating accounts of marine forms of life, and decorated with marvellous illustrations. The author also read before the British Association at Dublin, an account of the progress made in the official report of the expedition. It is expected that it will extend "to from fourteen to sixteen quarto volumes, of 500 or 600 pages, the whole illustrated by about 1200 lithographed plates, and many charts, woodcuts, and photographs."

In the rapidly growing literature of Embryology and its allied investigations, which endeavour to trace the whole circle of life in the individual or pair, from its earliest condition to the reproduction of identical forms in a second generation, the student will note, with satisfaction, Mr. Balfour's monograph on the development of the Elasmobranch fishes. The more so, that his researches have been greatly assisted by the assistance of the great zoological station at Naples, under the direction of Dr. Dohrn, of which the members of this society have heard something from Baron de Miklucho Maclay, a co-operator in its foundation. Perhaps the most generally interesting result of Mr. Balfour's inquiries is his acceptance of the view that the pectoral and ventral fins, and therefore the limbs of vertebrates in general, are the result of a gathering together and specialization of continuous Lateral frills, corresponding to those Dorsal and Ventral processes which have, for the most part, more closely retained their original character.

The literature bearing upon the Life History of Bacteria, which has already attained no inconsiderable magnitude, is summarised by Professor Ray Lankester ("Quarterly Journal of Microscopical Science," October, 1878, p. 455), in a notice from which students of this important subject will obtain directions to the last published results. The history of *Bacillus anthracis*, the

active cause of splenic fever, together with the more general question of Contagium Vivum, will be found discussed and illustrated in the same periodical. The extraordinary relations between man and the musquito, as unconscious confederates in the production of Elephantiasis, by means of the *Filaria sanguis hominis*, are explained in a paper by Dr. Manson, published in the "Annals and Magazine of Natural History," to which reference has already been made. It seems not unlikely that many other Endemic or local diseases will ultimately have their origin explained in a similar way; so that there is ground for a hope that we may be enabled to extinguish them by removing one of the two conditions under whose combination their living causes can alone exist. Another Filaria (*F. rhytopleuritis*) was found encysted in the common Cockroach as long ago as 1824, by Deslongchamps, and M. Osman Galeb has lately found the perfect or reproductive form of the same Nematoid in the intestines of the common Rat ("Comptes Rendus," July, 1878, p. 75). The ova, as discharged in the fæces, are swallowed by the Cockroach, which, in its turn, is eaten by the Rat. So also the Black Beetle (*Tenebrio molitor*), and the common Mouse combine to support their mutual parasite, *Spiroptera obtusa*. In the same way the Shrew, and one of the *Ohilognathidæ*, a species of *Glomeris*, maintain between them a certain Tapeworm (*Tænia pistillum*) whose history has been traced by M. A. Billop ("Comptes Rendus," Nov. 19, 1877. p. 971).

Considering the amount of pain, sickness, and disaster caused by such truly *Amphibious* animals, as Fluke, Hydatid, and Tapeworm, one is surprised to find that the facts already ascertained by Science should not be more generally known among educated people. Their attention cannot be too frequently or too emphatically invited to the subject, which really concerns the health and prosperity of the nation.

It may not be out of place here to mention that the first part of the "Osteographie des Monotrèmes vivants et fossiles," by P. Gervais, has now been published. The extreme isolation of the family, entirely Australian, and consisting of only two genera, *Ornithorhynchus* and *Echidna*, and the extra-mammalian rela-

tions which are indicated by the whole of their organization, render the work one of great prospective interest to all comparative Anatomists, and especially to those who have the advantage of studying these animals "at home."

The address of Professor Virchow, on the Liberty of Science, read before the meeting of the German Association at Munich in September, 1877, but not received here in time for notice in the President's address last year, has naturally attracted much attention among thinking men. The distinguished author is evidently under the suspicion that there may be some risk of an opinion coming to prevail that the spread of science is inconsistent with the interests of society, and under some apprehension that in such a case the existing organizations of government may interfere to limit to a serious, if not fatal, extent the freedom of scientific research. Discerning this danger upon the horizon, and startled, as I gather from his own words, at the addresses delivered by Professors Hæckel and Nägeli, he proceeds to draw a sharp demarcation between the Ascertained, which is Science, and the Hypothetical, which may or may not become Ascertained. For Science he claims perfect freedom, not only to study, but to teach, and, as it were, proselytize, by all the methods of a scientific propaganda, in the school, the university, the public press. But for the second kind of propositions, under which fall all disputed questions, whether as to particulars or general theories, he frankly surrenders all claim to such a right, illustrating and explaining with much humour the detriment to both science and society arising from an unwise ostentation of speculative views. It is not to be supposed that Virchow is at all an advocate for "mental reservation" in scientific utterance, or for a division of science into Exoteric for the People, and Esoteric for the Professors. But as he denies to society the right to interfere with science, so he refuses to the teacher the right to press mere theories upon the world; or, rather, he forbids him even to utter any Hypothesis, except before an audience which can understand what a Hypothesis is; of what use it may be; how almost certain it is to mislead; and that this particular statement is such a Hypothesis. Were Virchow's advice followed, there would be much less noise

made, but more work done, in science. But so happy a result is hardly to be expected. Scientific men, as well as others, have all, or almost all, an unscientific corner or two still left in the mind, in which personal vanity or petulant temper is dominant. Hence the equanimity, cheerfulness, or even exultation, with which the Simial origin of Man is flaunted before the eyes of those who regard such a doctrine with incredulity, disgust, or horror. It is not really a matter of Science which excites the combatants. It belongs to a totally distinct sphere of thought. The radical question which underlies all such strife is really this: Is the universe all and particular the work of design or not? And this question Science, as such, cannot answer now, and never will answer. Some of us cannot understand how it is possible for any one to shut his eyes against what seems to us obvious, ubiquitous, infinite, overwhelming evidence of Design. Evidence, I admit, which can not even show itself in the closed lists of purely Scientific Demonstration, but which nevertheless asserts itself as conclusive in the region of *Æsthetic*, *Moral*, and *Philosophical Necessity*. On the other hand, we have to accept the fact that there are many of high rank in the Scientific World who profess, at least, to believe the very opposite, who are never tired of proclaiming their emancipation from "gratuitous hypotheses" and other superstitions, and who protest that there is no such thing as that evidence to which we appeal, and ridicule our mediæval incapacity to grasp the Great Secret of an Unconscious, Chemical, Mechanical Evolution, the true key to the Enigma of the Universe.

The kind of teaching, however, against which Virchow mainly protests is the general propagation in schools, or by the press, of such doctrines as these:—"A cell consists of small particles, and these we call plastidules; plastidules, however, are composed of carbon, hydrogen, oxygen, and nitrogen, and are endowed with a special soul; this soul is the product or the sum of the forces which the chemical atoms possess." This is neither Science nor Gospel; it is Mumbojumbo. And if really great naturalists, who are continually face to face with the inquisition into, and cross-examination of, all facts that present themselves, can satisfy their minds with such bubbles, what may be expected from those who start

from these oracles as the basis of their knowledge, and arrange their ideas of fact in accordance therewith?

With such philosophers the Doctrine of Descent is converted into a sort of religion. It is destined, as Hierarch Hæckel says, "to bring man to arrange his life with his fellow-creatures—that is, the family and the State—not according to the laws of distant centuries, but according to the rational principles deduced from knowledge of nature. Politics, morals, and the principles of justice, which are still drawn from all possible sources, will have to be formed in accordance with natural laws only. An existence worthy of man, which has been talked of for thousands of years, will at length become a reality." To this end Religion as now understood must be eliminated. "The time has arrived to replace the antique dualistic and theological conception of life and spirit by the monistic or mechanical conception of the universe. We have arrived at the boundaries of the old and new faith." And, more distinctly still, "Modern morphology is irreconcilable, not only, I say, with the dogma of creation, but with that of a Providence, or (*even?*) of a vague idealistic Pantheism." Here are Fruits of Philosophy indeed! But what argument can be addressed to a philosopher who, with all his experience and vast attainments, is nevertheless capable of prophesying thus of the Theory of Descent, and who is eager to revolutionize the School in order to reconstitute the State under such a formula.

And it is worth our while to consider for a moment, what these "laws of nature," i.e., the Doctrine of Descent, signify in the Hæckelian system. We may call a hypothetical statement a law, if we please, but it must be definite. Every precise statement in science which gives the formula for all consequents upon given antecedents, antecedents on consequents, or concomitants upon concomitants, is a law. The law binds nothing, lays no obligation on matter, has (perhaps) no objective existence. But it must be co-extensive with our knowledge, and include all the known phenomena of its matter. And it should enable us not only to explain these, but also to foretell them, and that with accuracy and detail proportionate to its own sufficiency of truth. Such a proposition as this, "The sum of the squares of the sum

and difference of two numbers is equal to twice the sum of their squares," is not commonly called a law. Yet so far as the logical value of the statement is concerned, it differs in nothing but relative certainty from this, "Equal volumes of all substances, when in the state of gas, and under like conditions, contain the same number of molecules." And this in the same way differs only in degree of probability from the following:—"One cubic inch of gas under one atmosphere and at the freezing point contains one quadrillion* molecules." Or from this, "The mean velocity of hydrogen molecules" under the same conditions "is 6097 feet per second." These propositions may not be exactly true, but they are definite, and therefore in the position of at least hypothetical laws. But when Hæckel speaks of the laws of Inheritance, of Established or Habitual Transmission, of Contemporaneous or Homochronous Transmission, of Homotopic Transmission, of Individual Adaptation, of Monstrous or Sudden Adaptation, of Sexual Adaptation, of Indirect or Potential, or of Direct or Actual Adaptation, one sees that he is giving the name of law to a mere phrase. Here is the Law of Universal Adaptation: "All organic individuals become unequal to one another in the course of their life by adaptation to different conditions of life, although the individuals of one and the same species remain mostly very much alike." And this is, I believe, the most definite statement of law which is to be found in Hæckel's "History of Creation." I should be sorry to be supposed to be in any way pretending to criticise the theory of Darwin, which is, to say the least, a most brilliant, attractive, and fruitful hypothesis, and is in all probability true, under various limitations which remain as yet undetermined, and in combination with that belief in Design which it is supposed by many to contradict. But I protest against the presumption that it is a full statement of all the causes producing the amazing and overpowering variety, beauty, and utility of organic structures, from the exquisitely delicate tracery of the diatom, which has only been detected by the most powerful instruments which the science and ingenuity of the present day can invent, to the prodigious complexity of the human system. "What a piece

* 1,000,000,000,000,000,000,000,000.

of work is man! How noble in reason! How infinite in faculty! In form and moving how express and admirable! In apprehension, how like a god! The beauty of the world! The paragon of animals!" Yet to the distempered mind of Hamlet all this is but the "quintessence of dust," just as to the fanatical Darwinist it is but a Chemical and Mechanical development of an Ape; as the Ape is of the Marsupial, as the Marsupial is of the Newt, the Newt of the Shark, the Shark of the Worm, and the Worm of a microscopic pellet of Autogenous Protoplasm. Nothing more, but only this!

It is likely enough that for all their wild speeches, the evolutionists, like the positivists before them, do not really intend to work any organic change in society, or to injure its moral foundations. Their self-satisfaction is too contemptuous of humanity. But we may be assured that to passionate and miserable people, writhing under the merciless curb of political restraint, and out of whom, when forcibly intermixed with the criminal classes, grow Internationalists, Socialists, and Nihilists, these doctrines are no abstractions, but most tremendous realities. They cannot, in their pitiable circumstances, but grasp at any straw that seems to give a chance of a happier existence. And they will act, while the professors are talking. Governments which see this will, as a matter of course, interfere with the promulgation of those doctrines; and, as not even the most enlightened among them is capable of drawing Virchow's line, the just freedom of science will suffer for the vainglorious liberties of the Scientists. If this so-called science threatens society, society will play the mischief with science itself.

In recording the death of our venerable and distinguished fellow-colonist, the Rev. W. B. CLARKE, F.R.S., F.R.G.S., &c., I have a melancholy satisfaction in bearing my personal testimony to the wonderful kindness, I may almost say, eagerness, with which he was always ready to assist the investigations of others, in spite of frequent disappointments and unmerited slights. It is unnecessary, in this place, and before this audience, to dwell upon his lifelong devotion to science, and the services, which, by his explorations and writings, he has rendered to this community,

and to science in general. For forty years he was incessantly engaged with the Geology of Australia, without, on that account, neglecting the various duties which his profession involved. And when at last, in his 81st year, that night came in which no man can work, it found him adding, with a still busy and energetic hand, the last touches to his last and scarcely completed labours.

It is understood that his valuable Library, and quite invaluable collections, maps, and papers, are to be secured for the use of the public of New South Wales. It will be difficult to display them in any existing building, except, perhaps, the Australian Museum, in which a space might possibly be cleared on the second floor, for their separate exhibition. The Maps and memoranda should be published, with all possible dispatch; and no time lost in *editing*. Their unavoidable imperfections are not blemishes, and the monument, for such it is, ought to be completed before the memory of the man is effaced.

Although Mr. R. Daintree, C.M.G., F.G.S., was not, except in one particular instance, directly connected with the Geology of New South Wales, yet his services, both in Victoria and Queensland, have proved of the very highest service to all the Australias. In Victoria he was associated with Mr. Selwyn, then director of the unfortunately interrupted Geological survey of that Colony, in the investigation of the so-called Carbonaceous beds at Cape Patterson and elsewhere. And in Queensland, where he was appointed (1869) Government Geologist for the Northern district, he not only, in the two or three years of his official employment, traversed vast tracts of hitherto unexplored country, but was able to lay down, with a surprising amount of detail, a general map of its Geology. Here he also obtained much valuable data for the determination of that vexed question, the age of the New South Wales coal, to which I have already referred. Since 1871, he had not been resident in Australia; and his health, which had been much injured by exposure and hardship finally broke down altogether in the month of July last, when he died at the early age of 47.

The death of Dr. Bleeker, the accomplished Ichthyologist, whose magnificent work on the Fishes of the Indian Seas affords

most valuable assistance in the study of the Fishes of our waters, as well as that of Pfeiffer, who had contributed largely to the determination of the airbreathing Mollusca of Australia and the neighbouring regions, must not pass without remark.

Mr. Carron, too, the last of the three who survived poor Kennedy's disastrous expedition, and well known for his extensive and accurate acquaintance with the Flora of Australia, as also for his readiness to impart to others his valuable stores of information, has now been permanently removed by death from his duties in the Botanic Gardens.

In conclusion, I desire to express my obligations to the Society in general for the kindly feeling which has been always manifested towards myself throughout the two years during which I have, however unworthily, occupied the Presidential chair. I have also to thank the Hon. W. Macleay, M.L.C., for his examination of the proceedings of English and European Societies, and Dr. Woolls for an abstract of Botanical progress, without which I could have given but a brief notice of the subject. I should also once again venture to call your attention to the desirability of re-establishing our system of open air studies, whether under the name of Field Club, or other designation. There is no question as to its popularity, and no doubt or hesitation in any one's mind as to its excellent effect in stimulating the pursuit of Natural History.

On the motion of the Hon. W. Macleay, M.L.C., seconded by the Rev. Dr. Forrest, the thanks of the meeting were accorded to the author for the Address now read, and it was agreed that it should be duly printed in the Proceedings of the Society.

The meeting then proceeded to the ordinary business of the day.

The Treasurer presented his Financial Statement, duly audited, showing that the Receipts had amounted to £215 8s. 3d., and the Disbursements to £206 10s. 9d.

The following gentlemen were elected as the Officers of the Society for the year 1879:—

President—REV. J. E. TENISON-WOODS, F.L.S., F.G.S., ETC.

Vice-President—W. J. STEPHENS, ESQ., M.A.

Hon. Treasurer—H. H. B. BRADLEY, ESQ.

Hon. Secretary—THE HON. W. MACLEAY, M.L.C.

COUNCIL.

H. G. ALLEYNE, ESQ., M.D.

J. C. COX, ESQ., M.D.

E. P. RAMSAY, ESQ., F.L.S.

JAMES NORTON, ESQ.

P. MACKAY, ESQ.

C. S. WILKINSON, ESQ., FGS.



Fig. 1 + 2

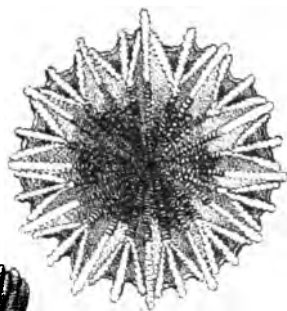


Fig. 3 + 4



Fig. 2 + 2

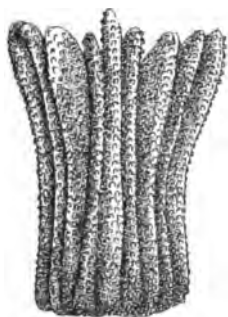


Fig. 4 + 8

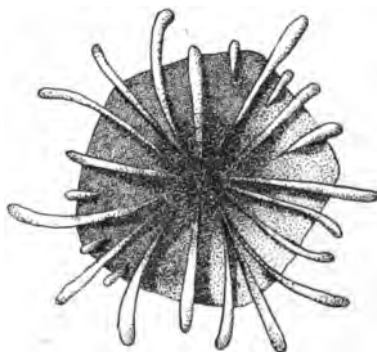


Fig. 7 + 4

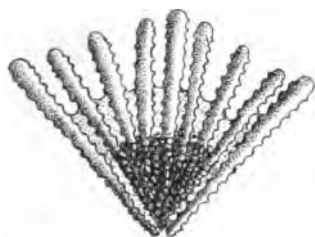


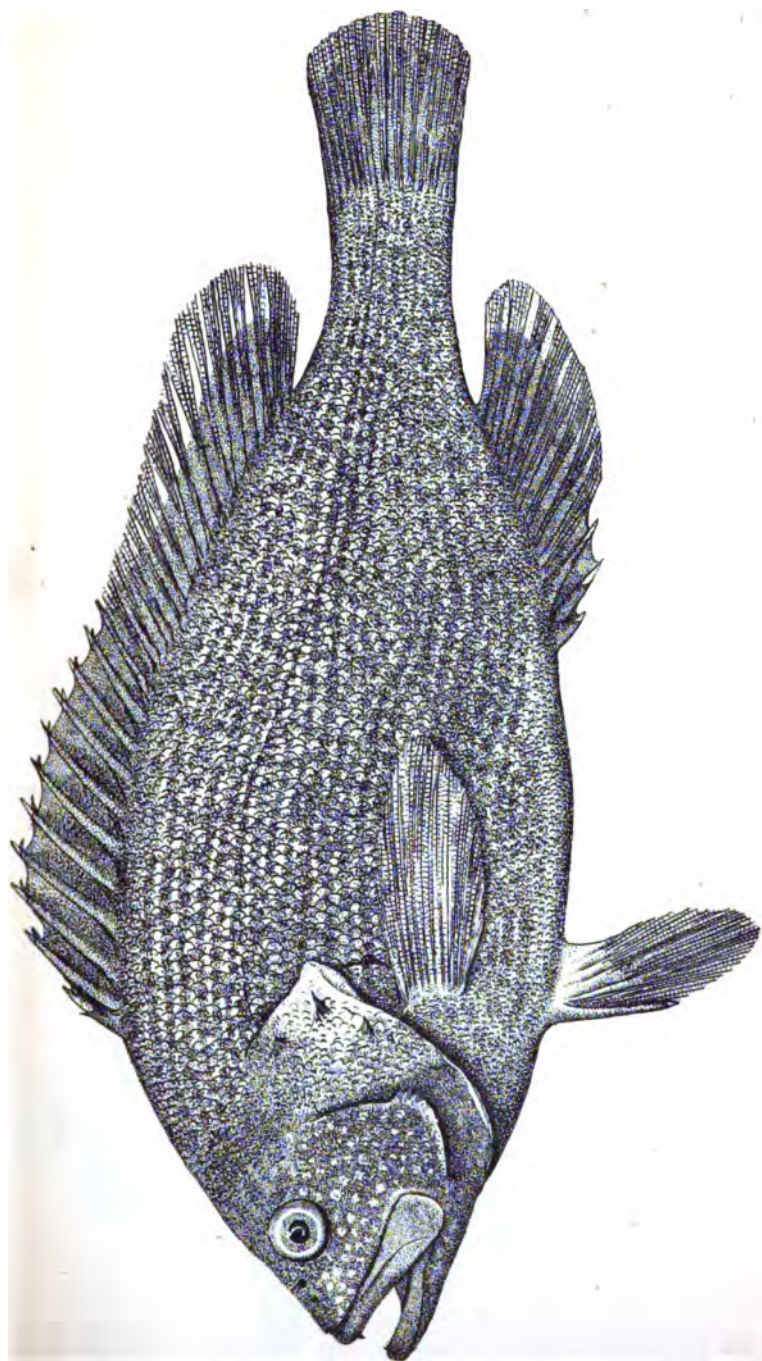
Fig. 5 + 10.



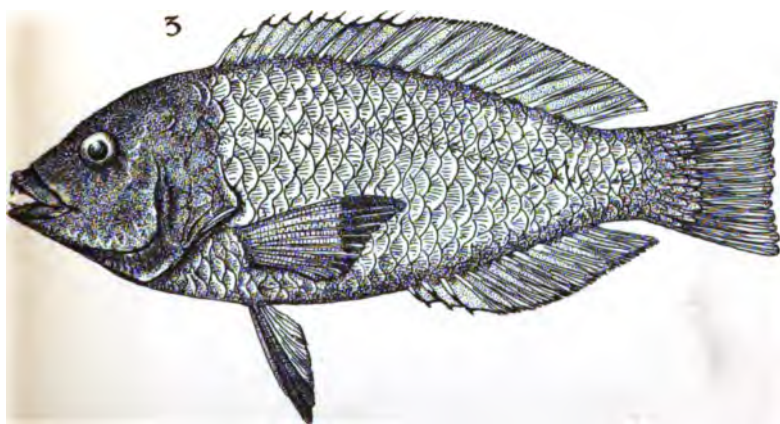
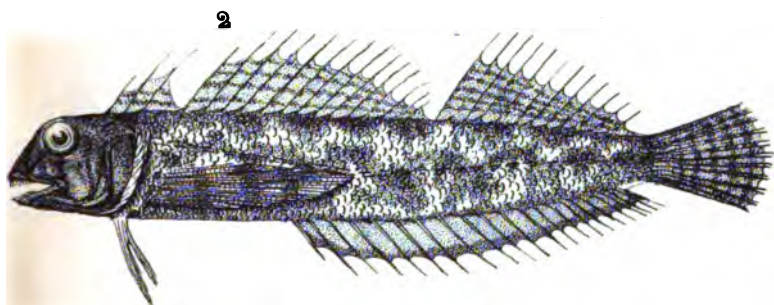
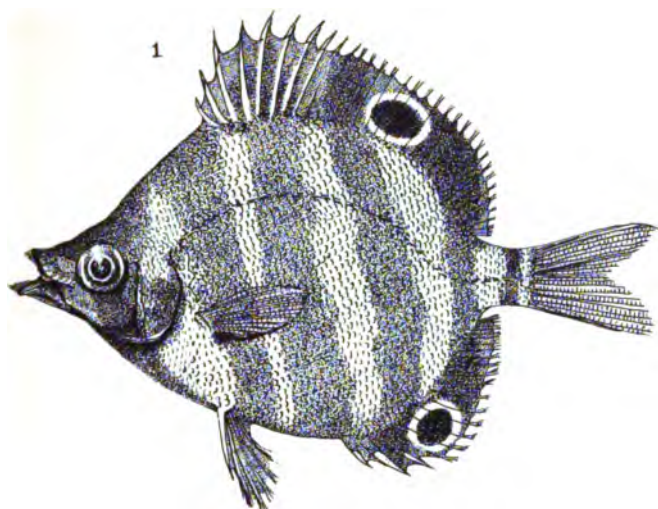
Fig. 8 + 4

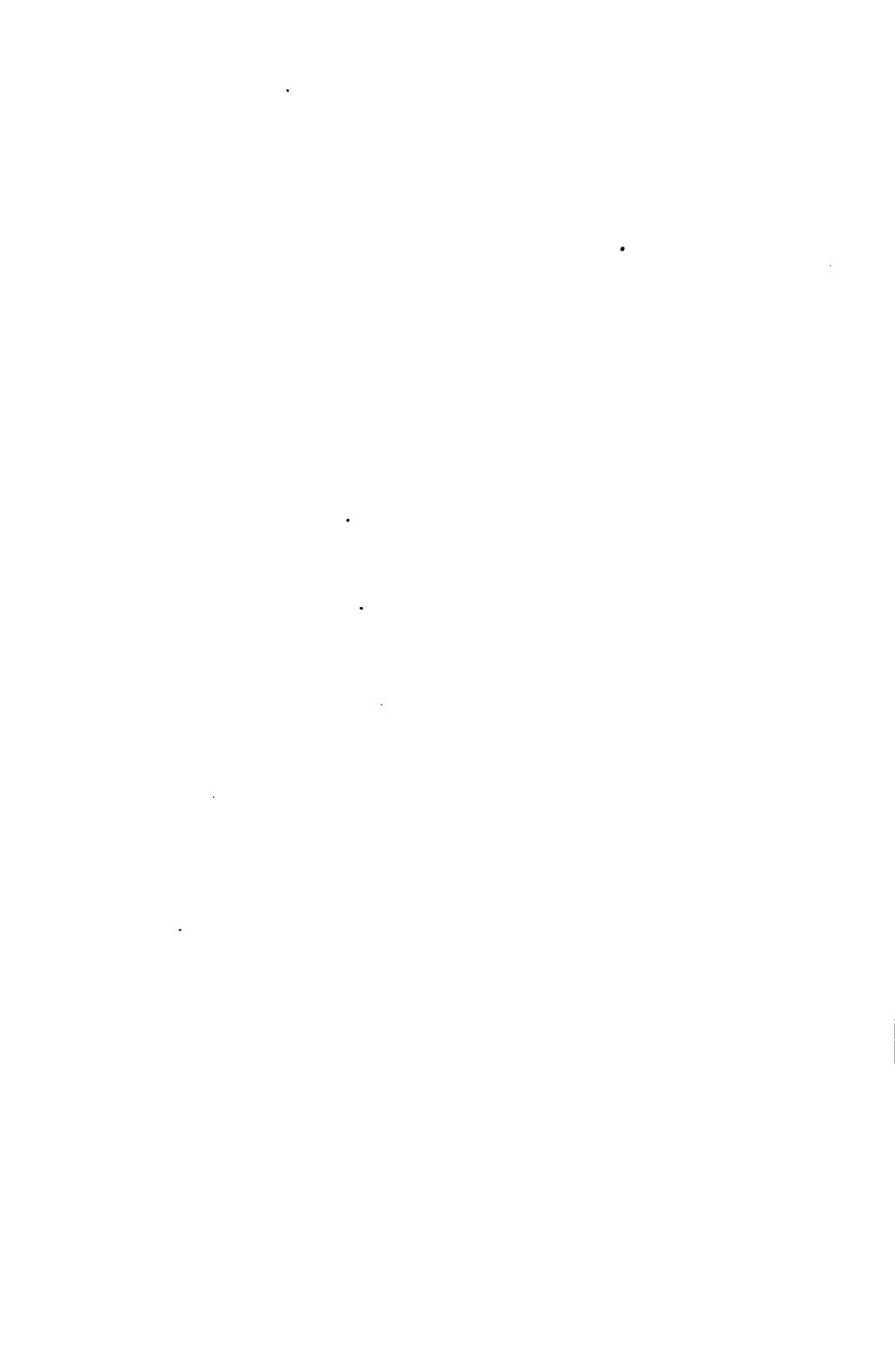


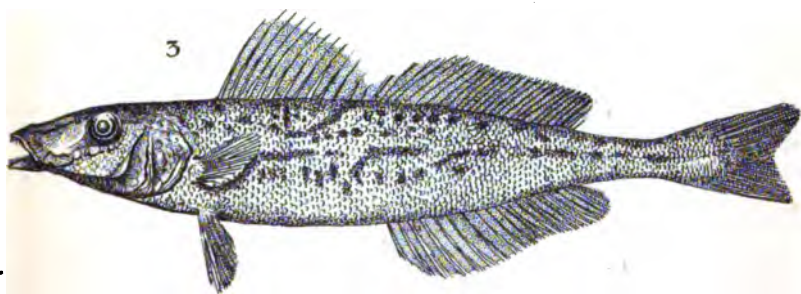
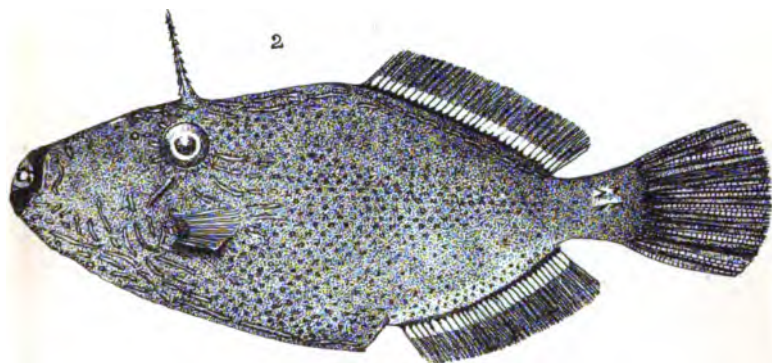
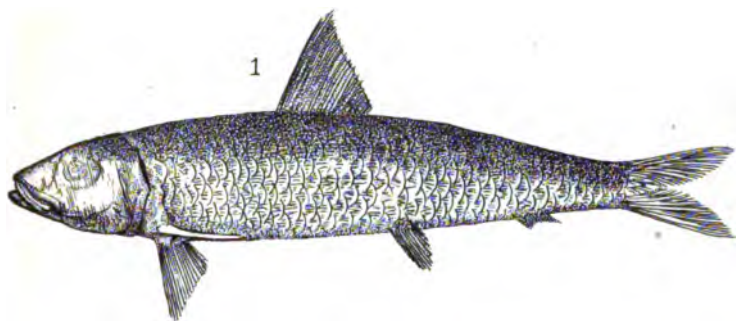
Fig. 6 + 5









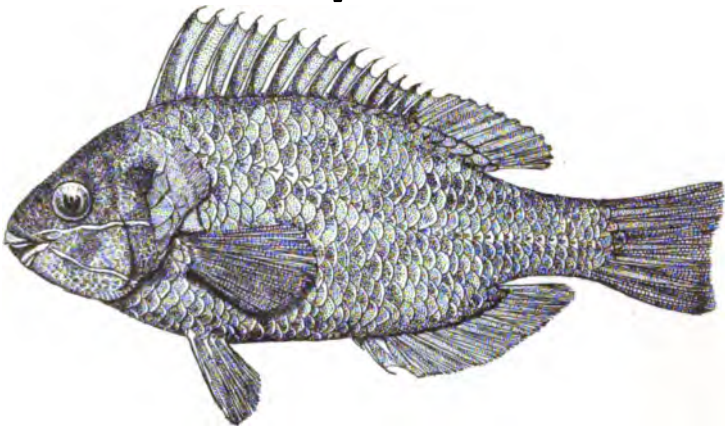




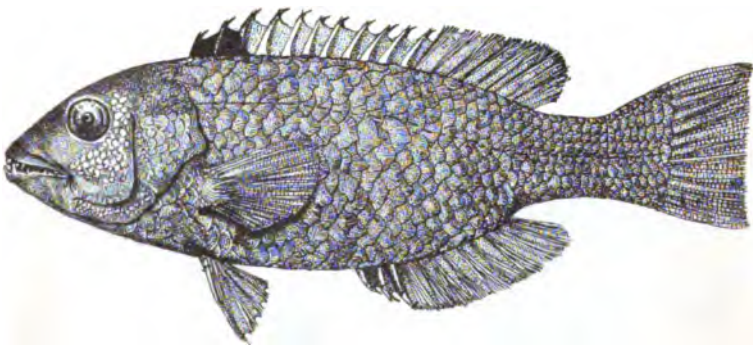
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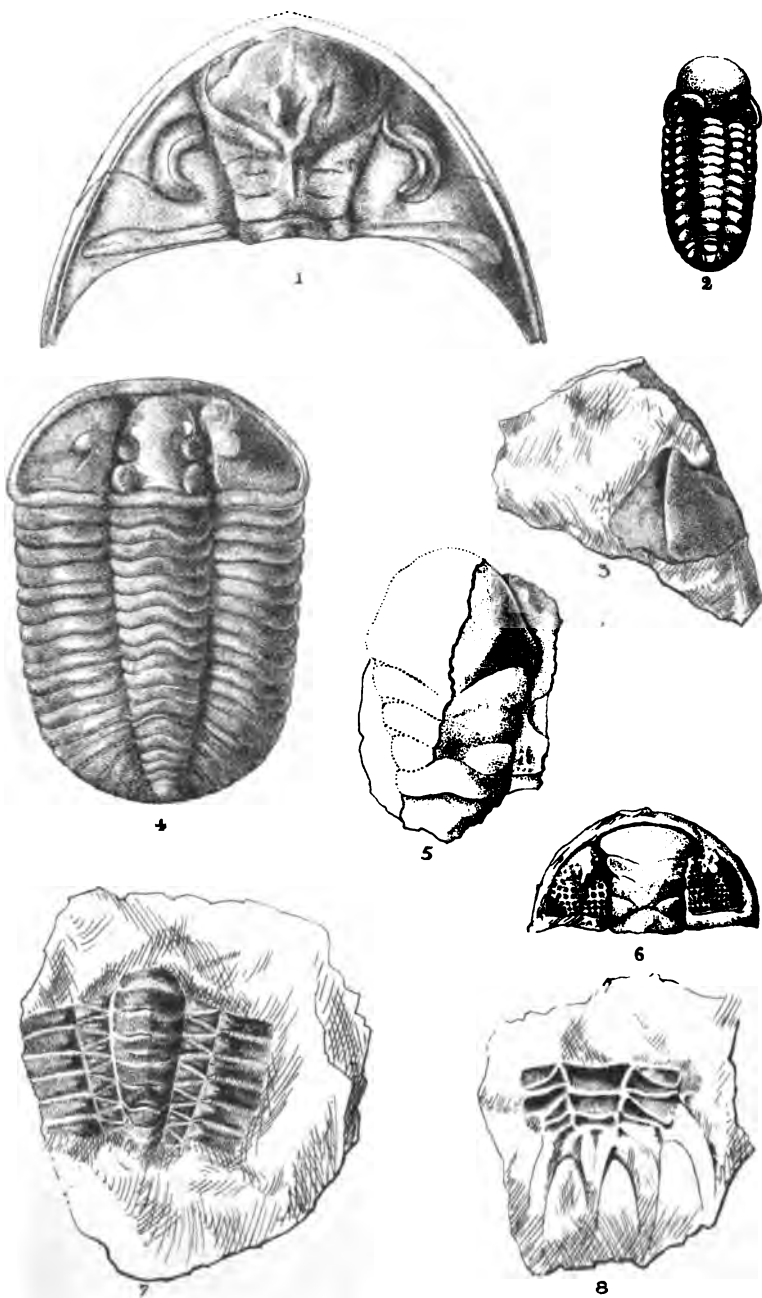


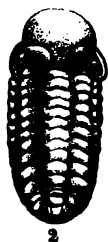
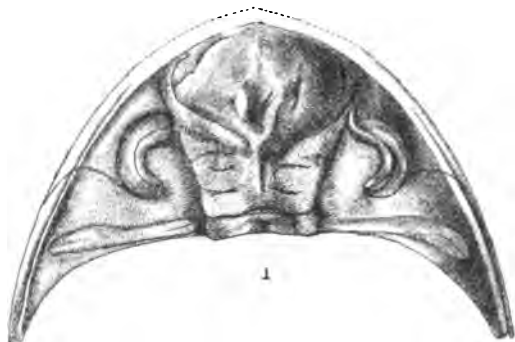
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1b



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2b



2c



3a



4



5b



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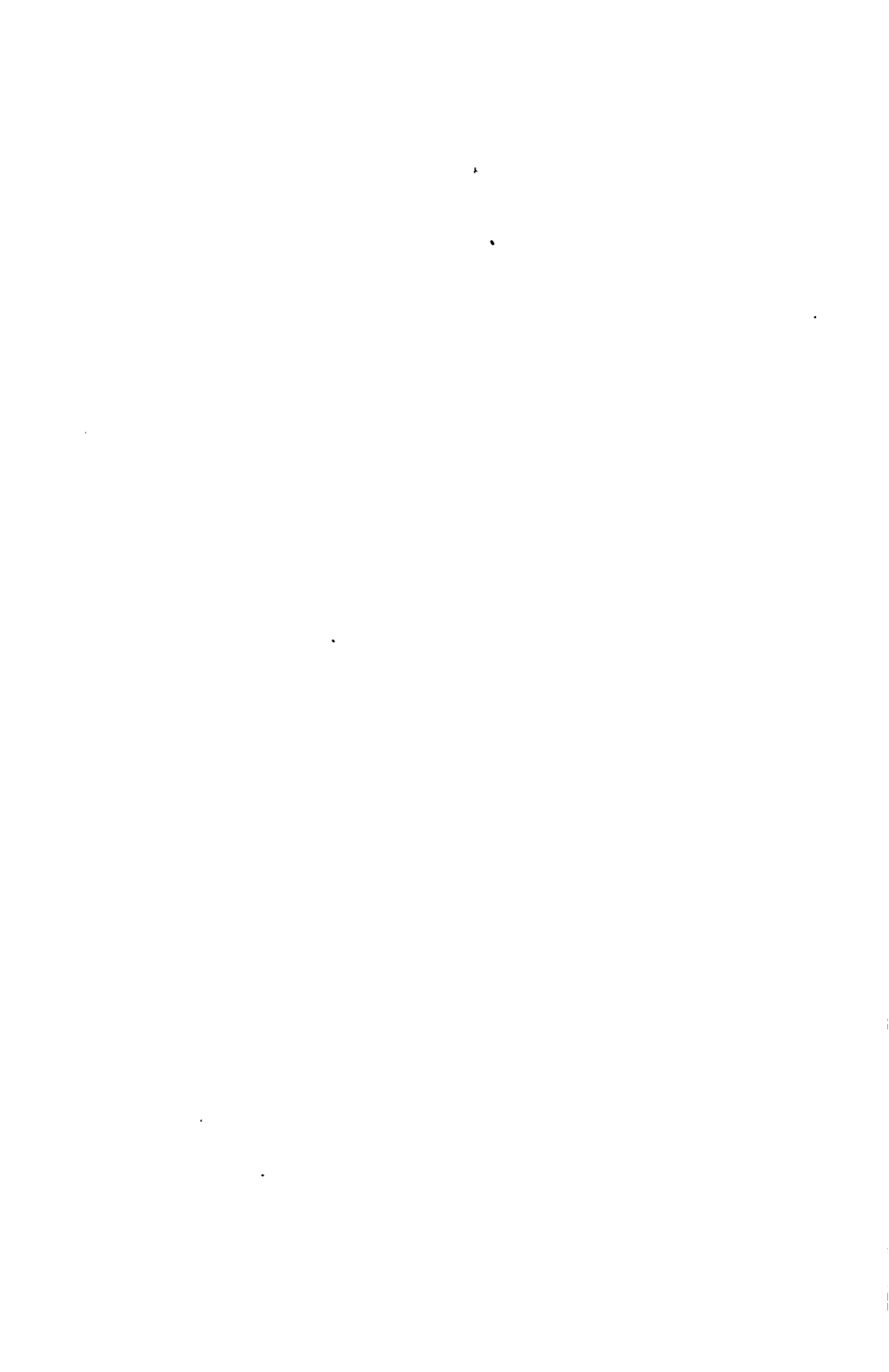
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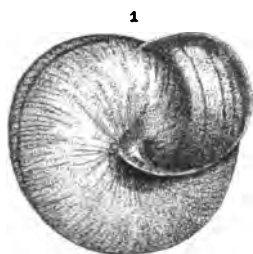


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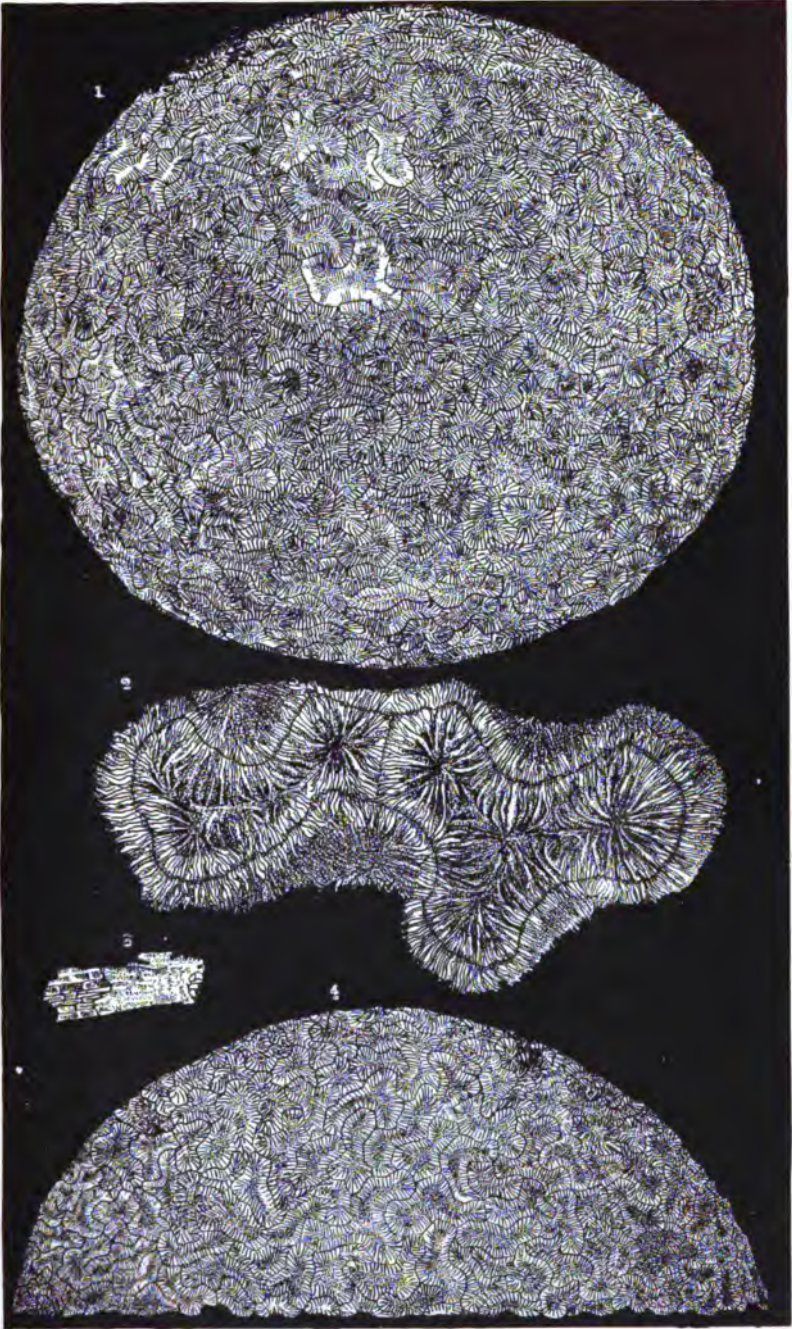


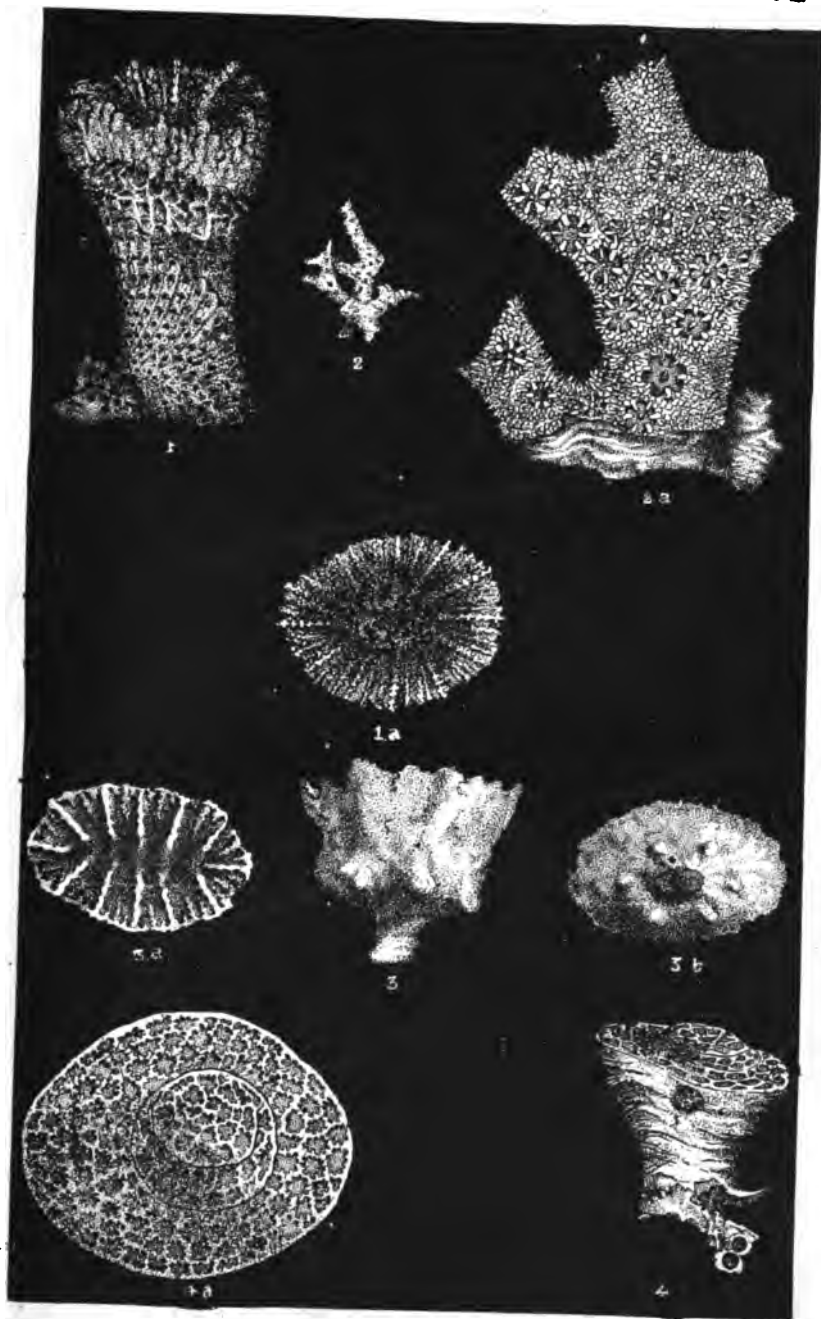
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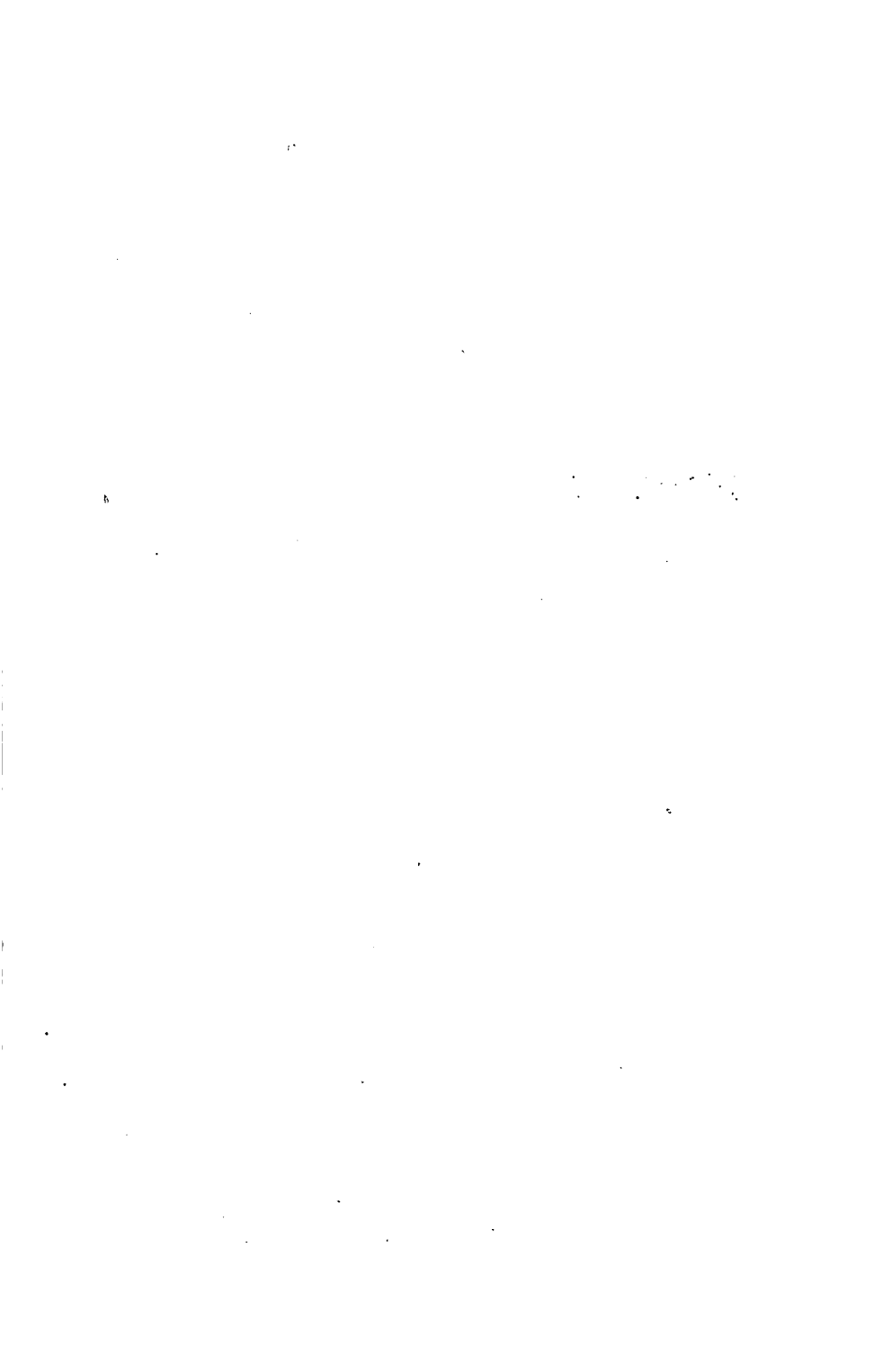


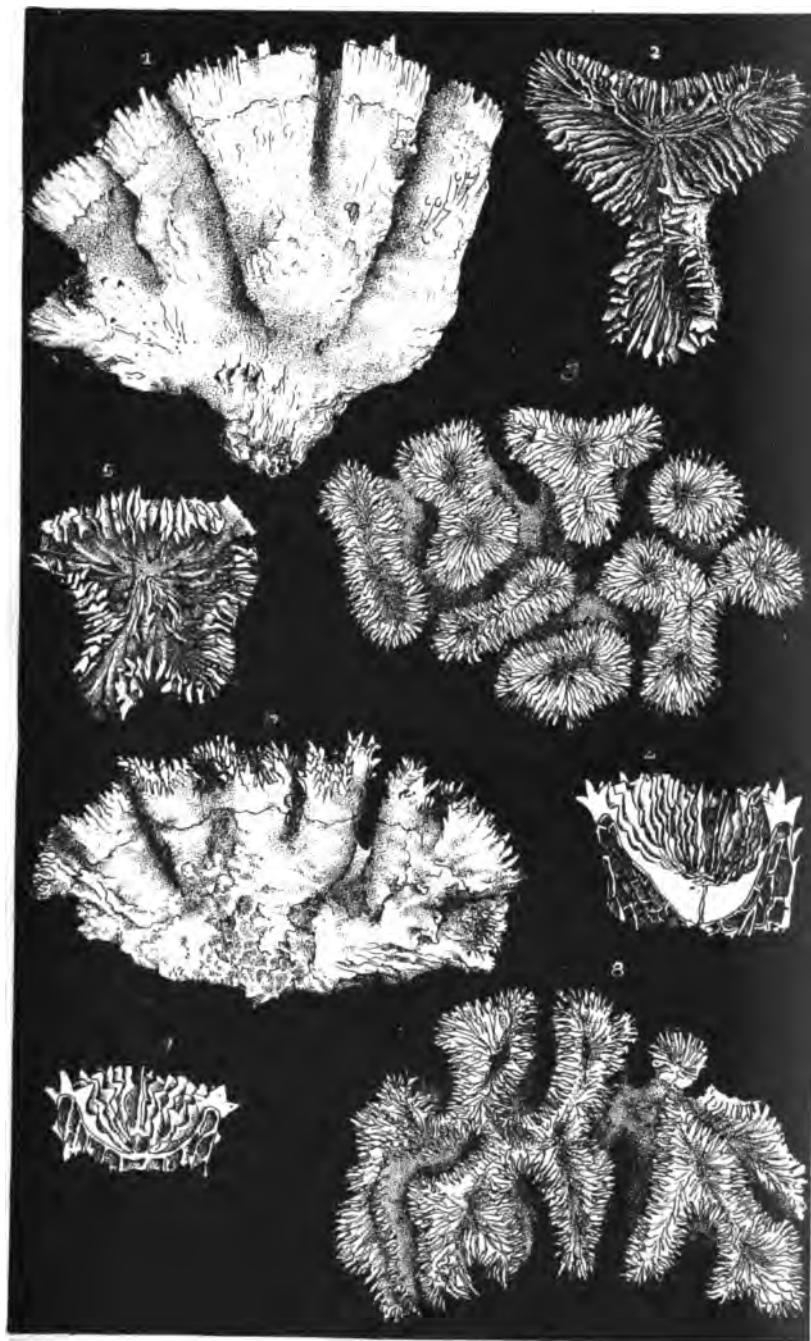


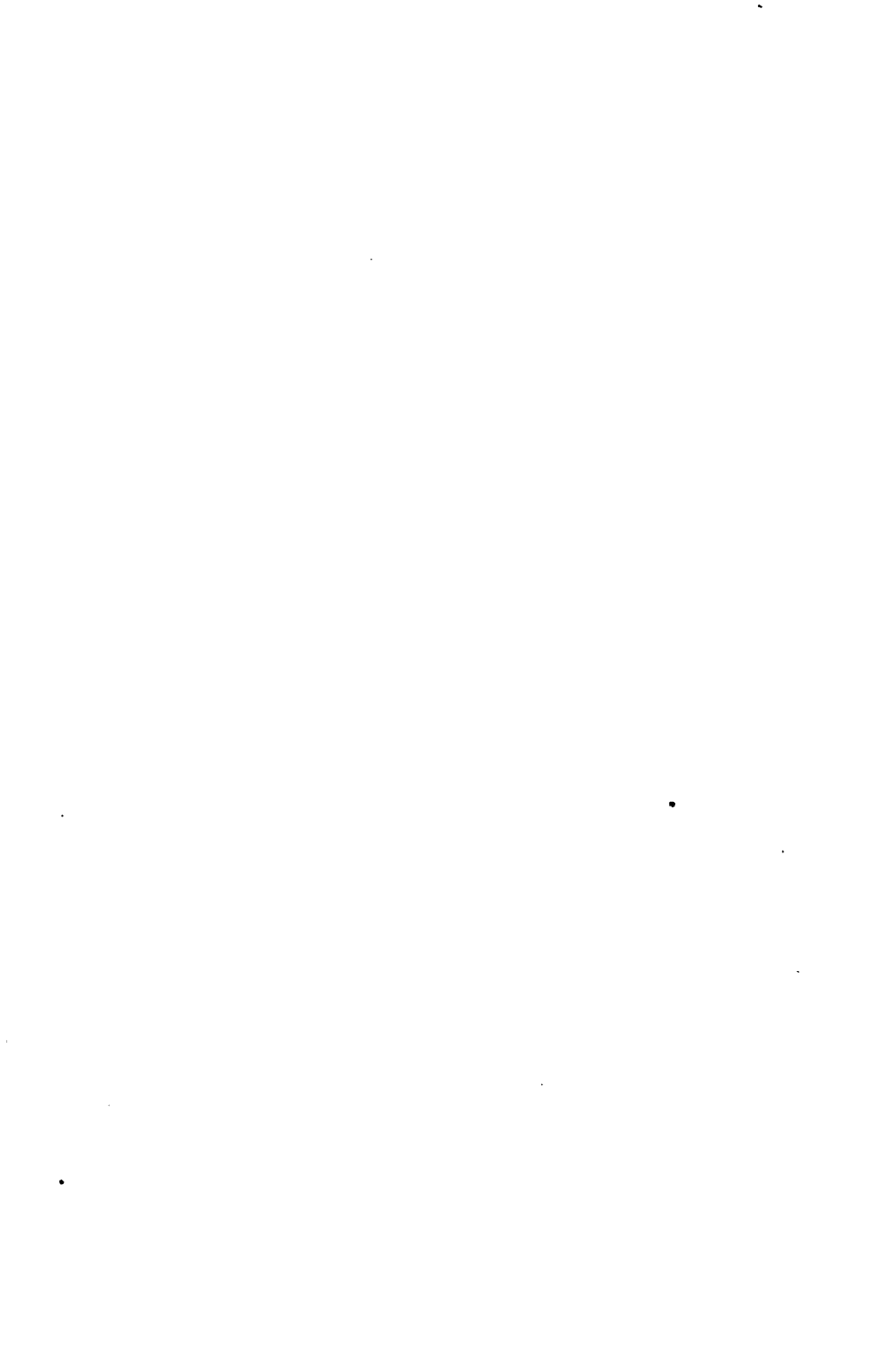


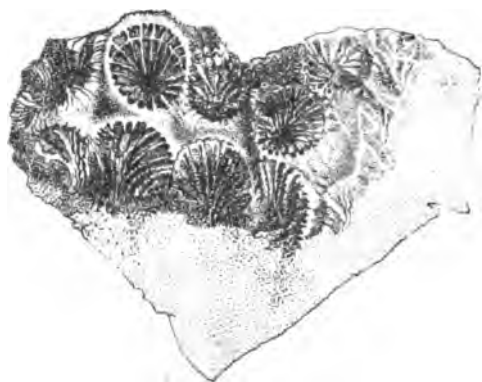




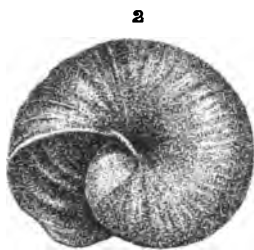




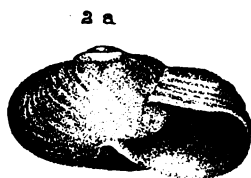




1



2



2 a



5. a

1



3



5.

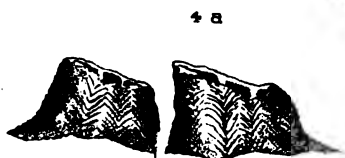


3 a.

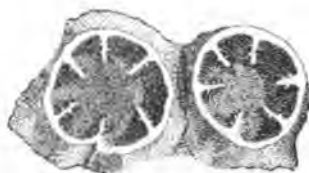


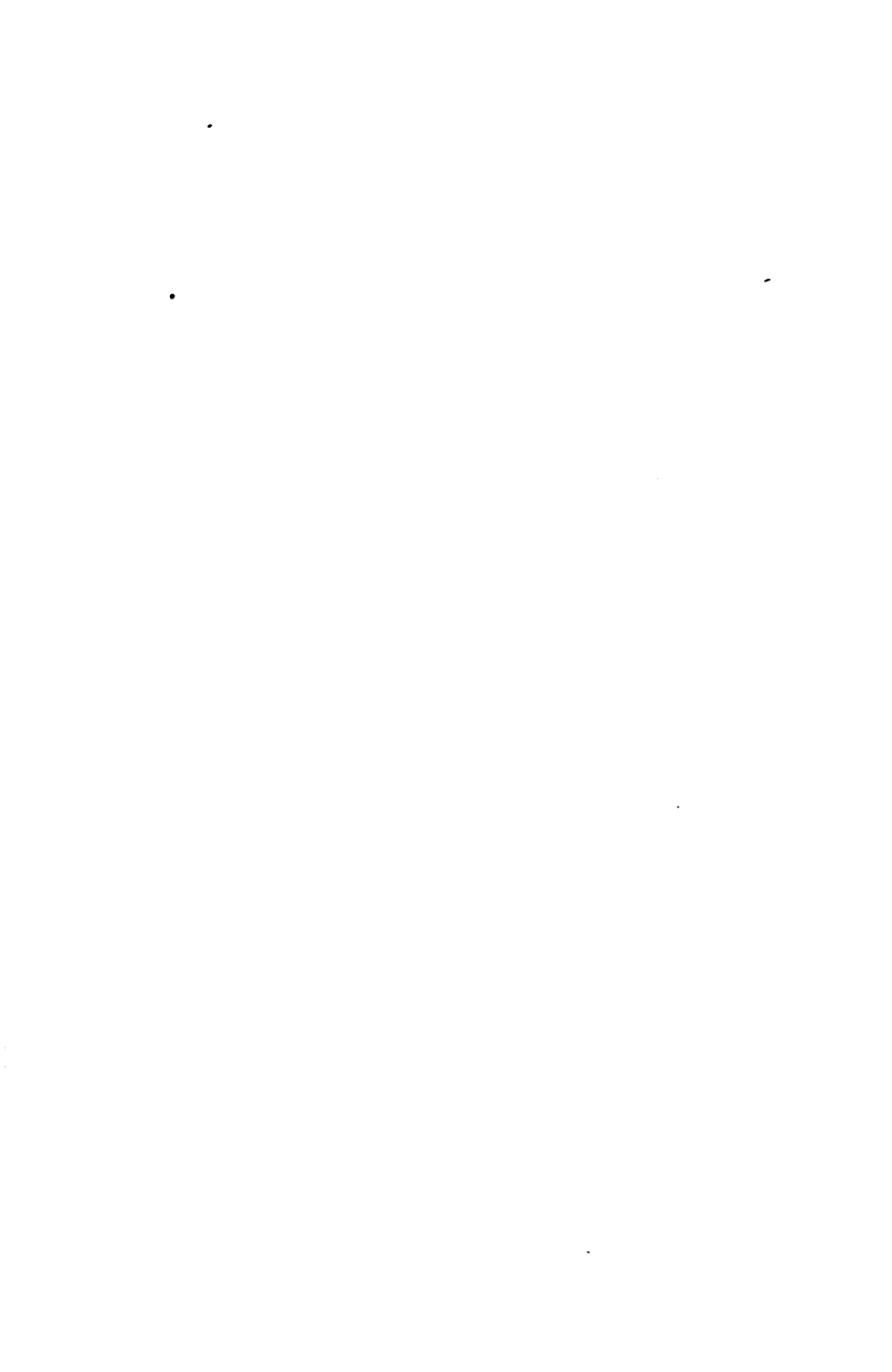
4

4 b



4 a



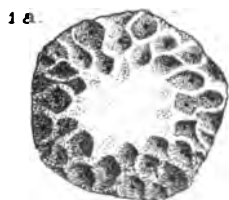




1c.



1b.



2.



3.



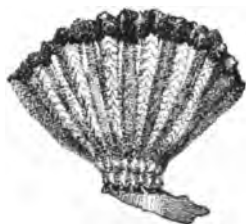
7a.



4.



7.

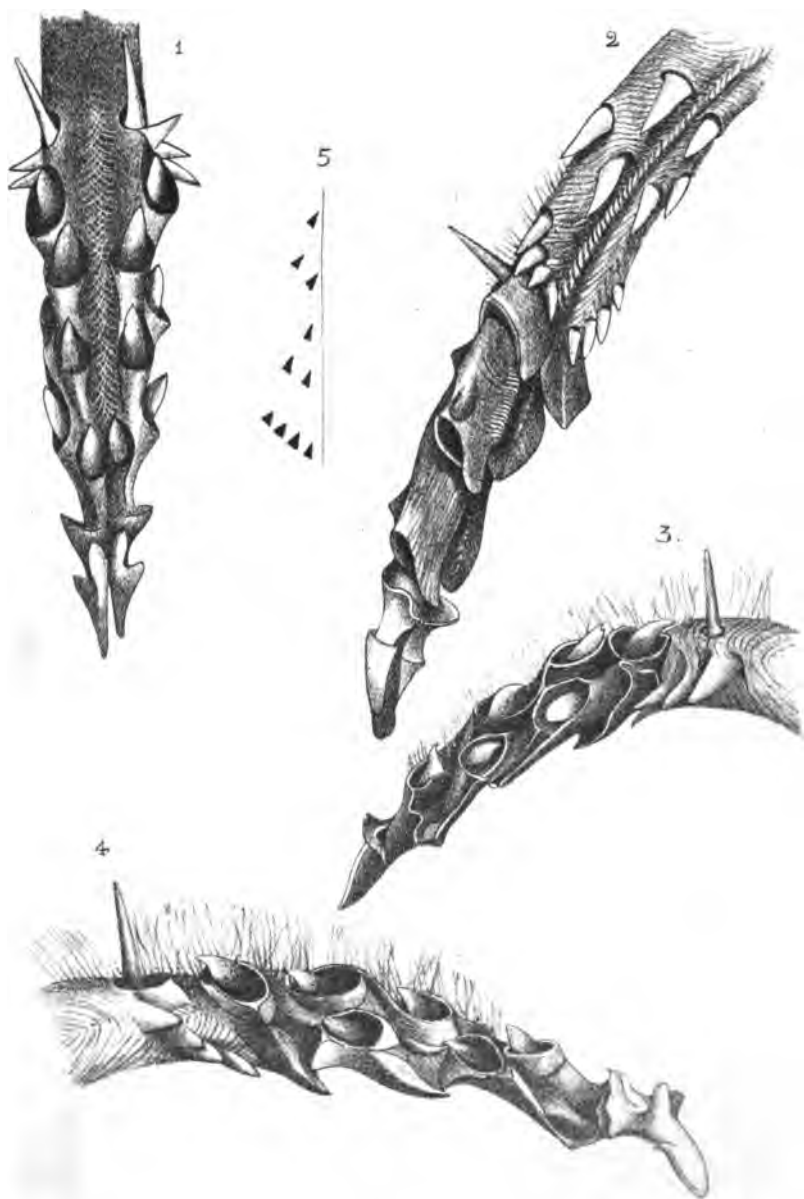


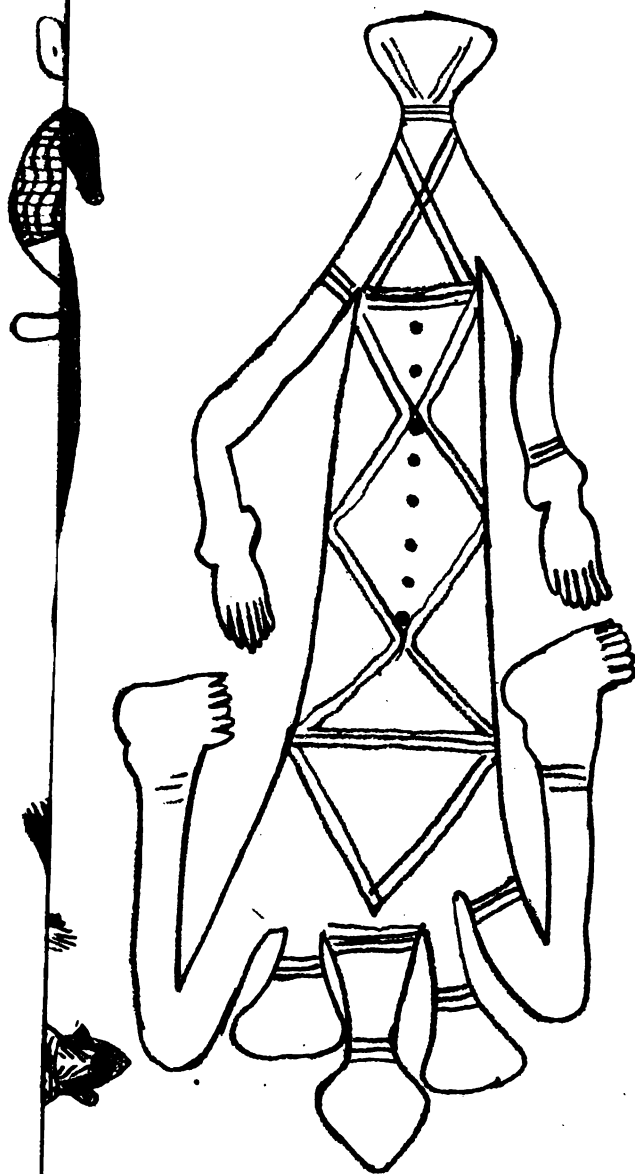
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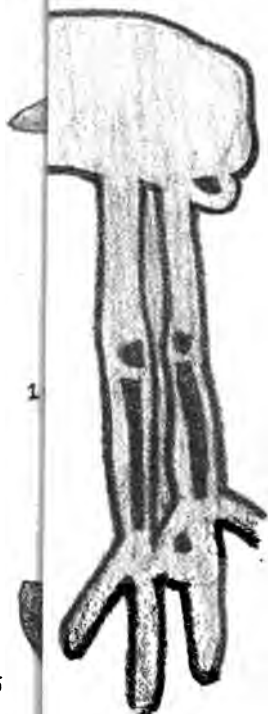


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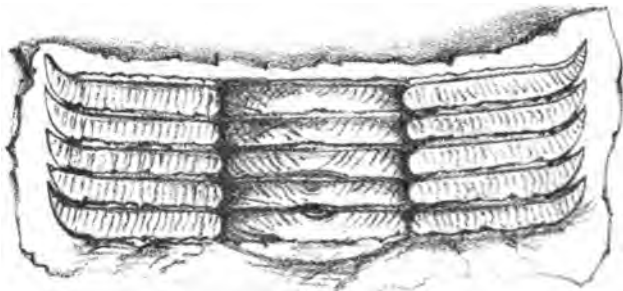
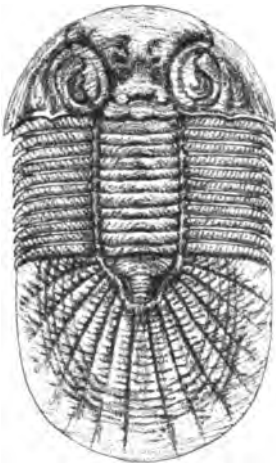






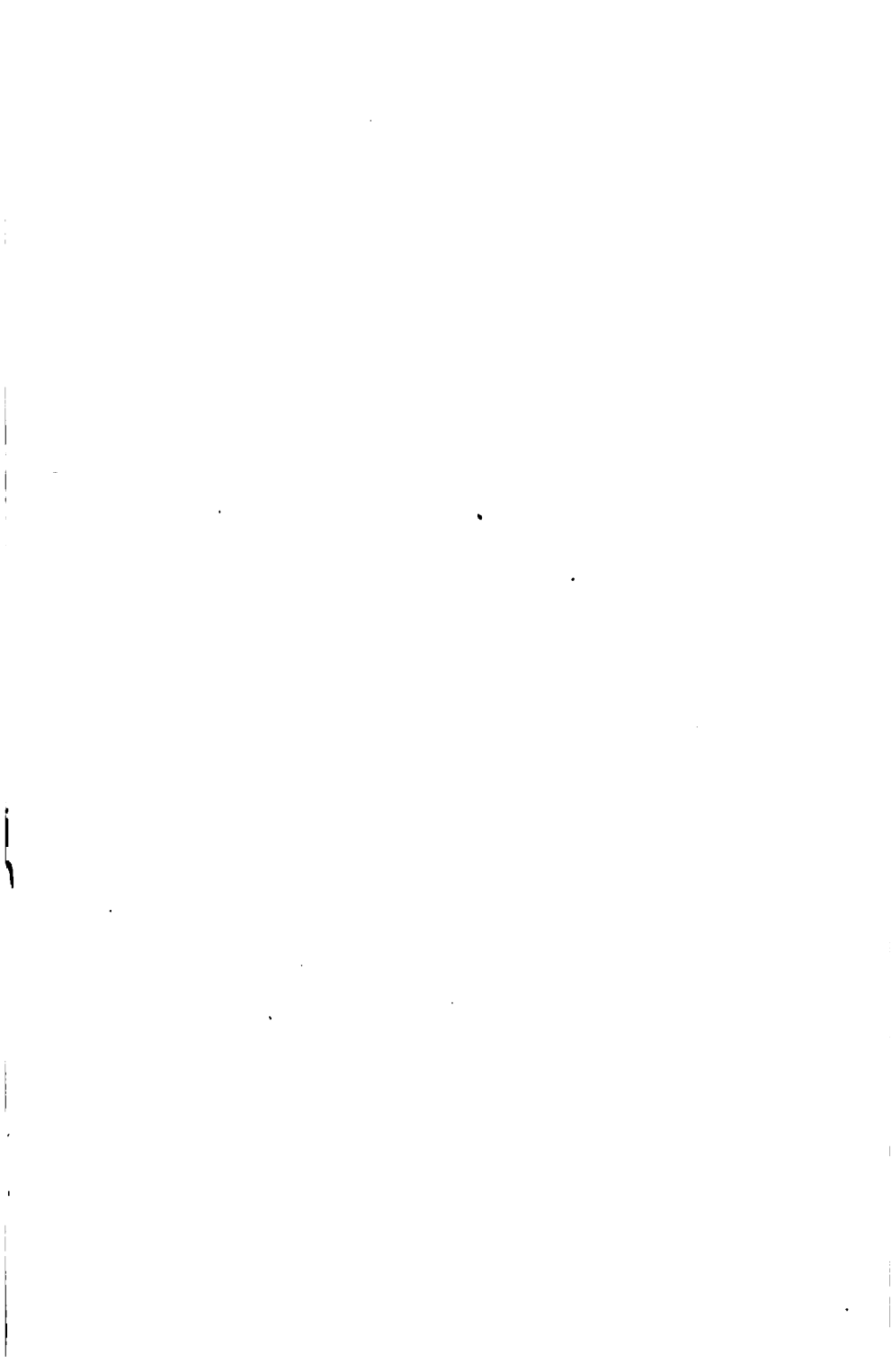
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18

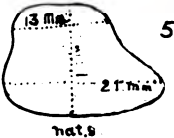
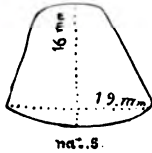


8.



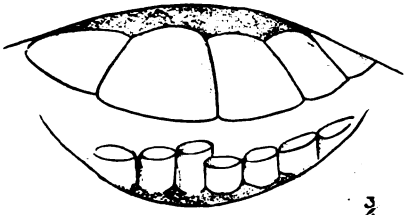


1



5

3.



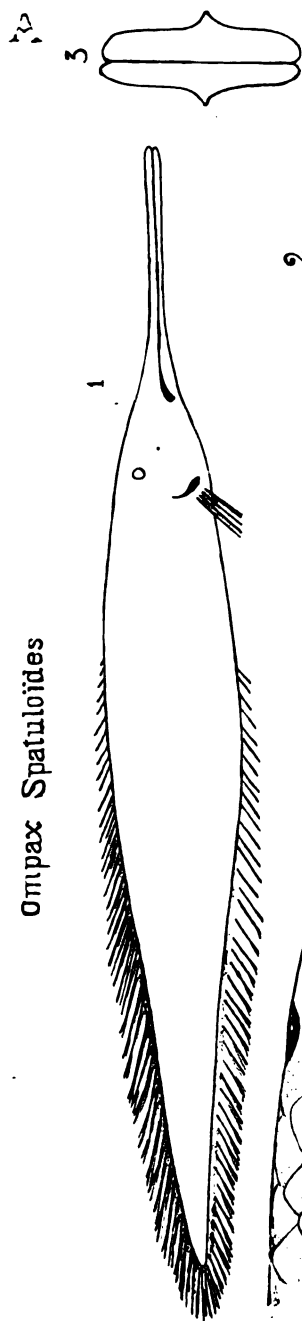
$\frac{3}{4}$ nat. s.

2



M. Mackay and nat. Del.
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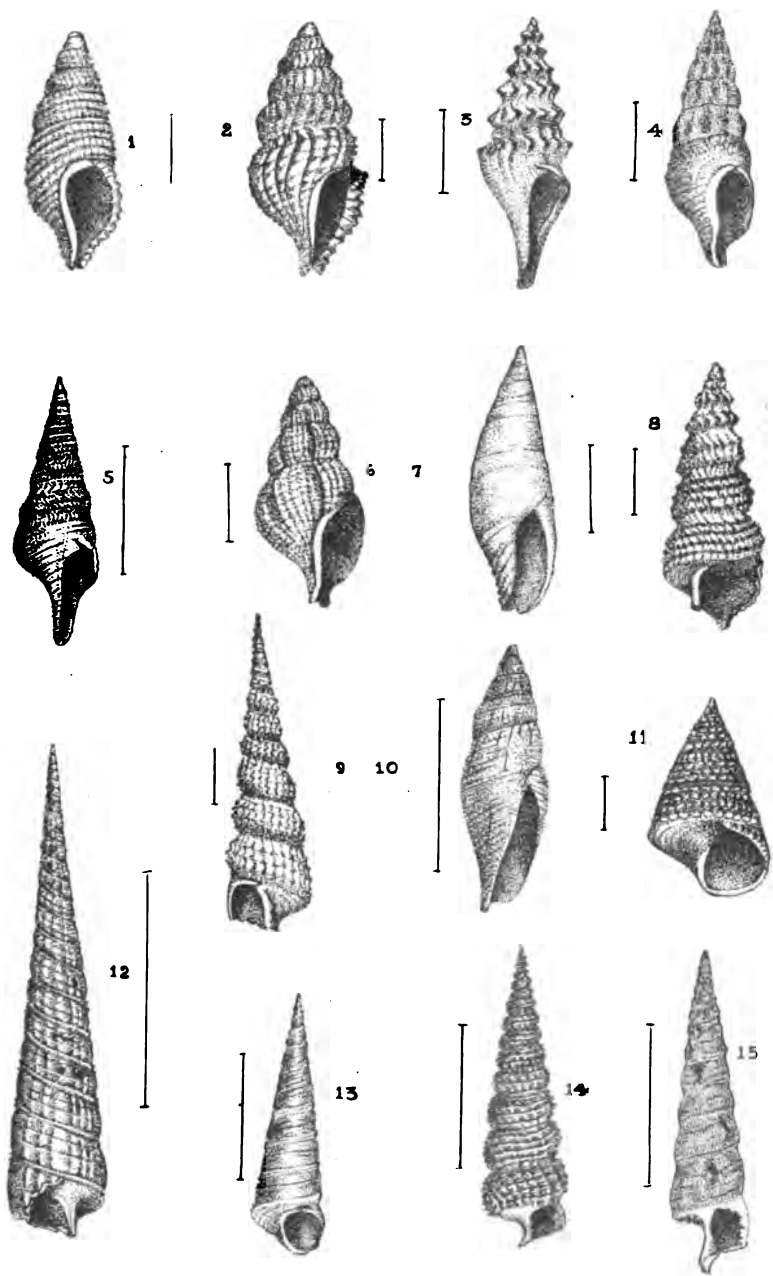
Ompax spatuloides

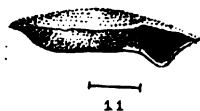
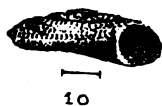
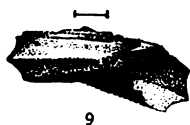
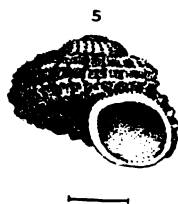
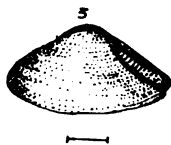
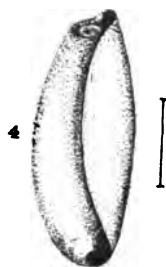
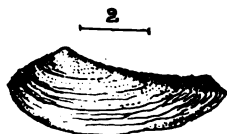
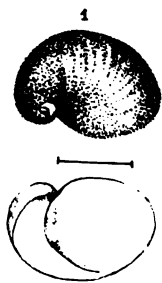


Amphisile komis n.s.

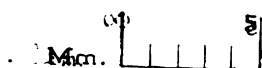
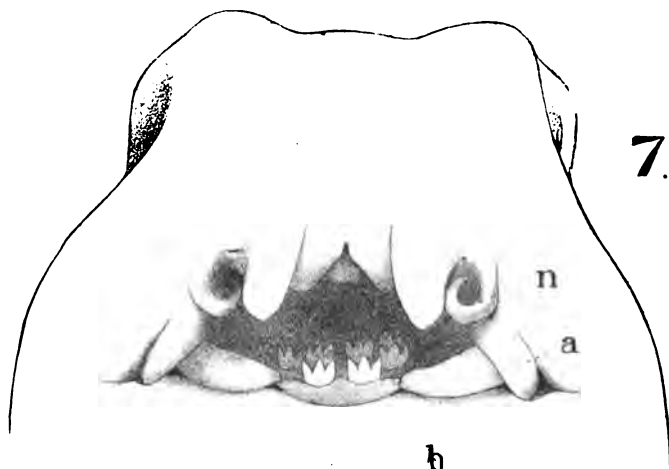


Sec. a b.





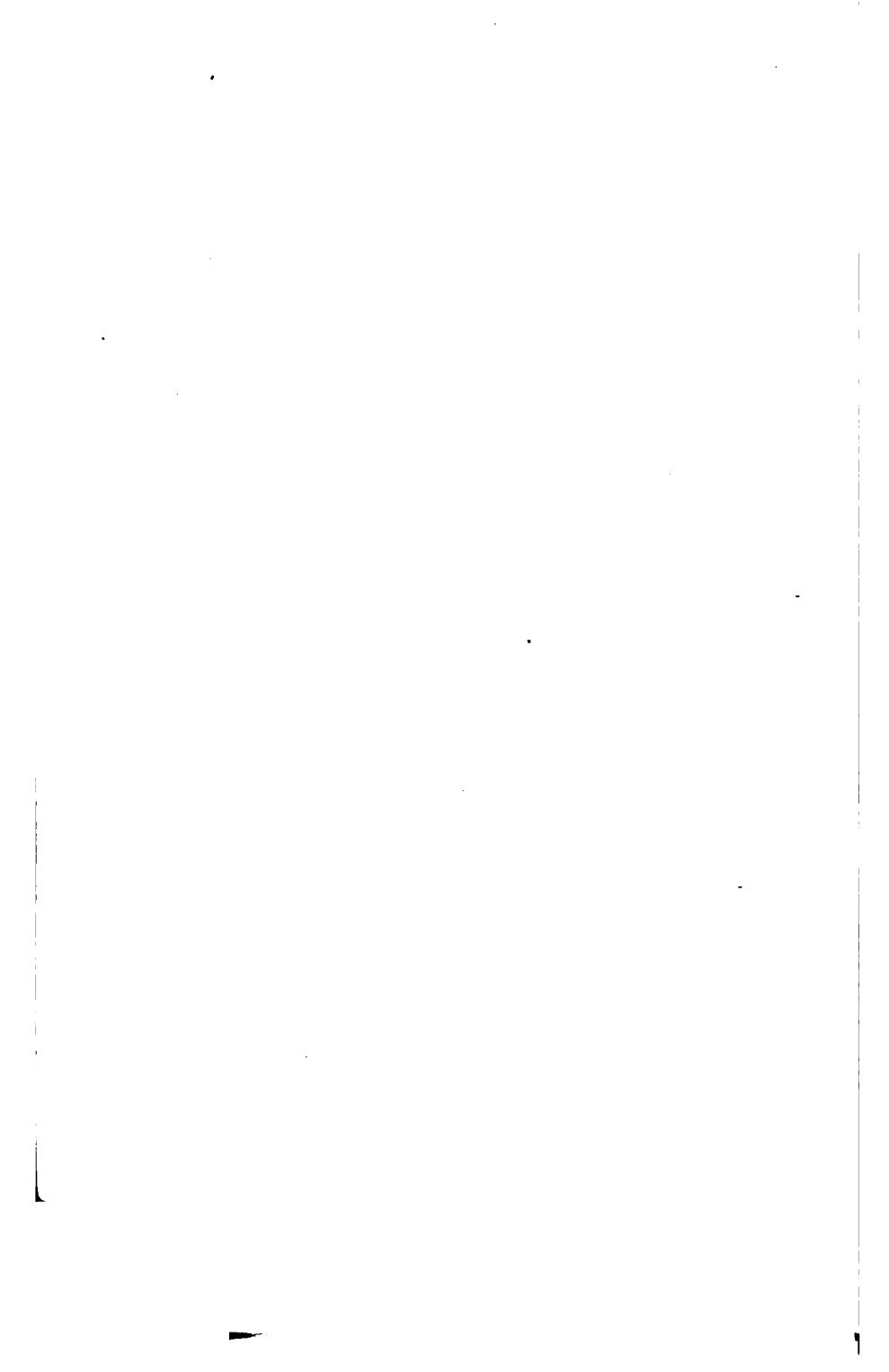




$\frac{2}{1}$ Nat. S.

Sp.

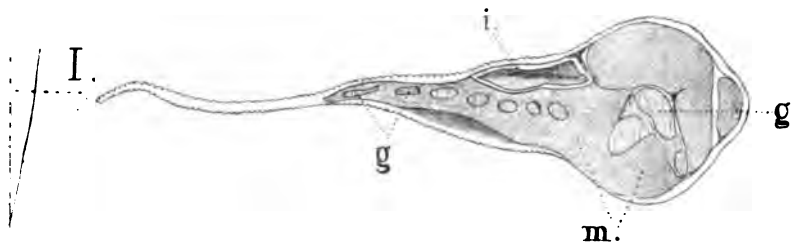
8.



Nat. S.

21. Nat. S.

1 (21)



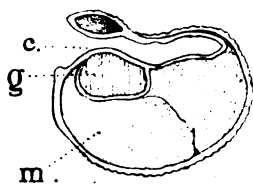
II.

II (21).

IV

22.

Nat. S.

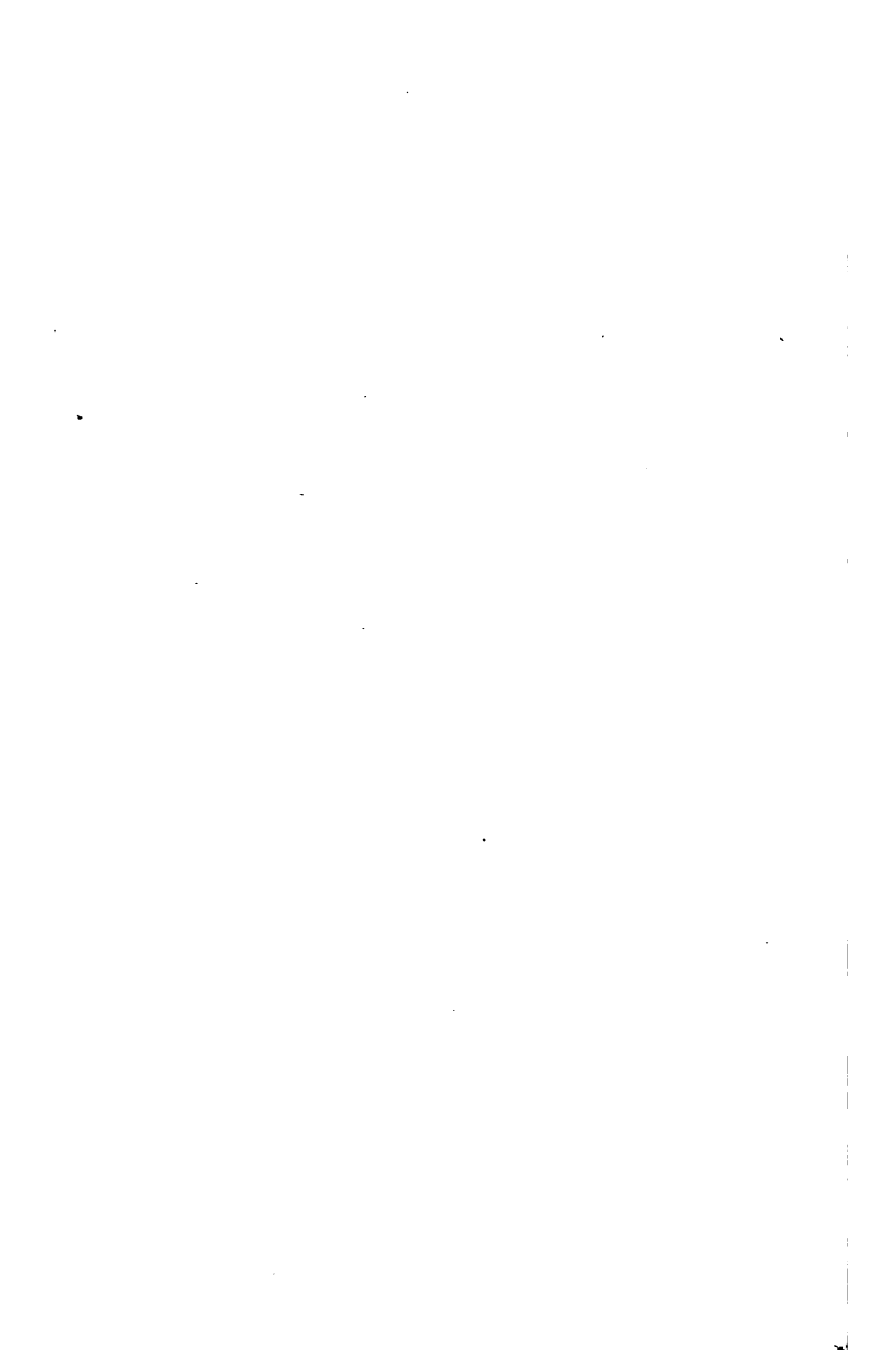


III (21)

k.

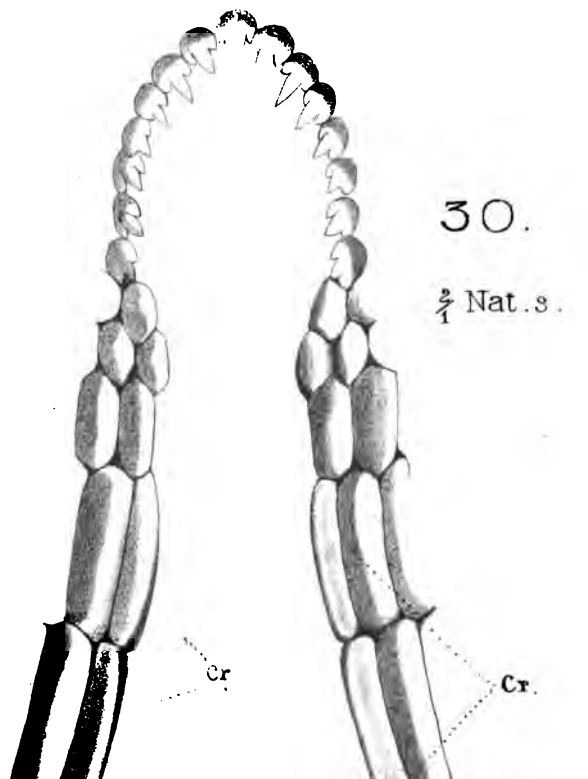
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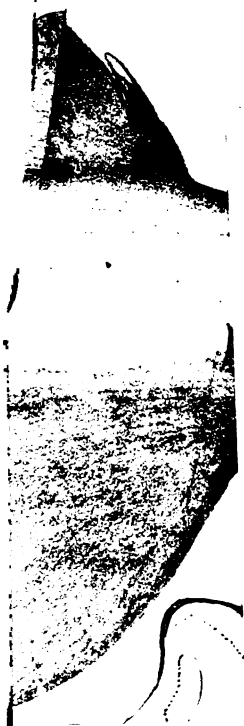
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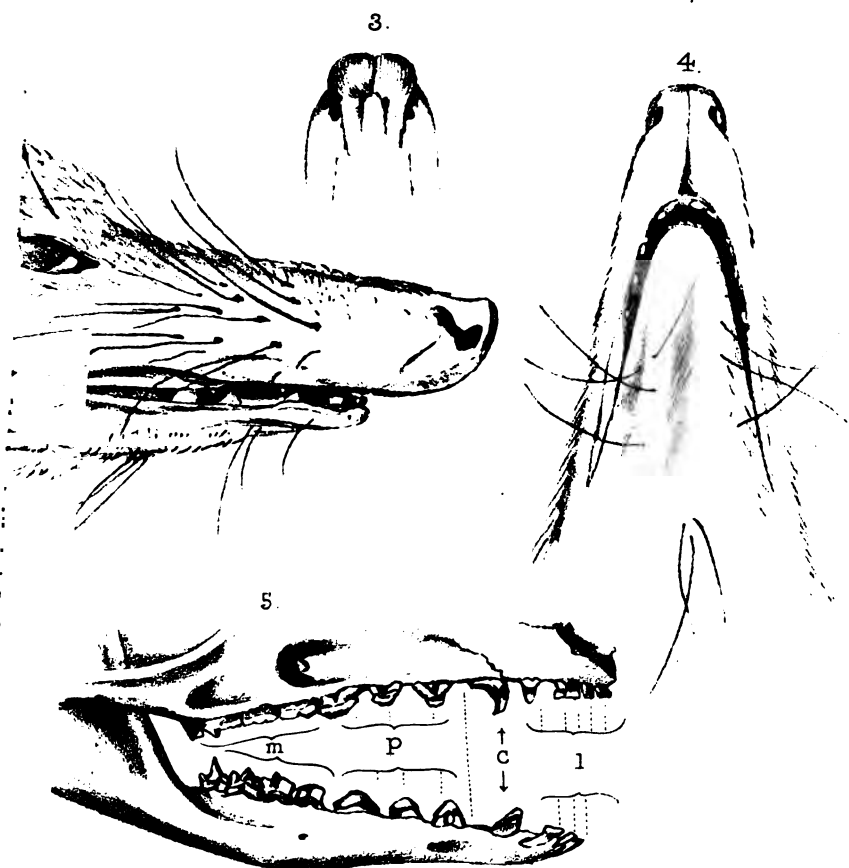


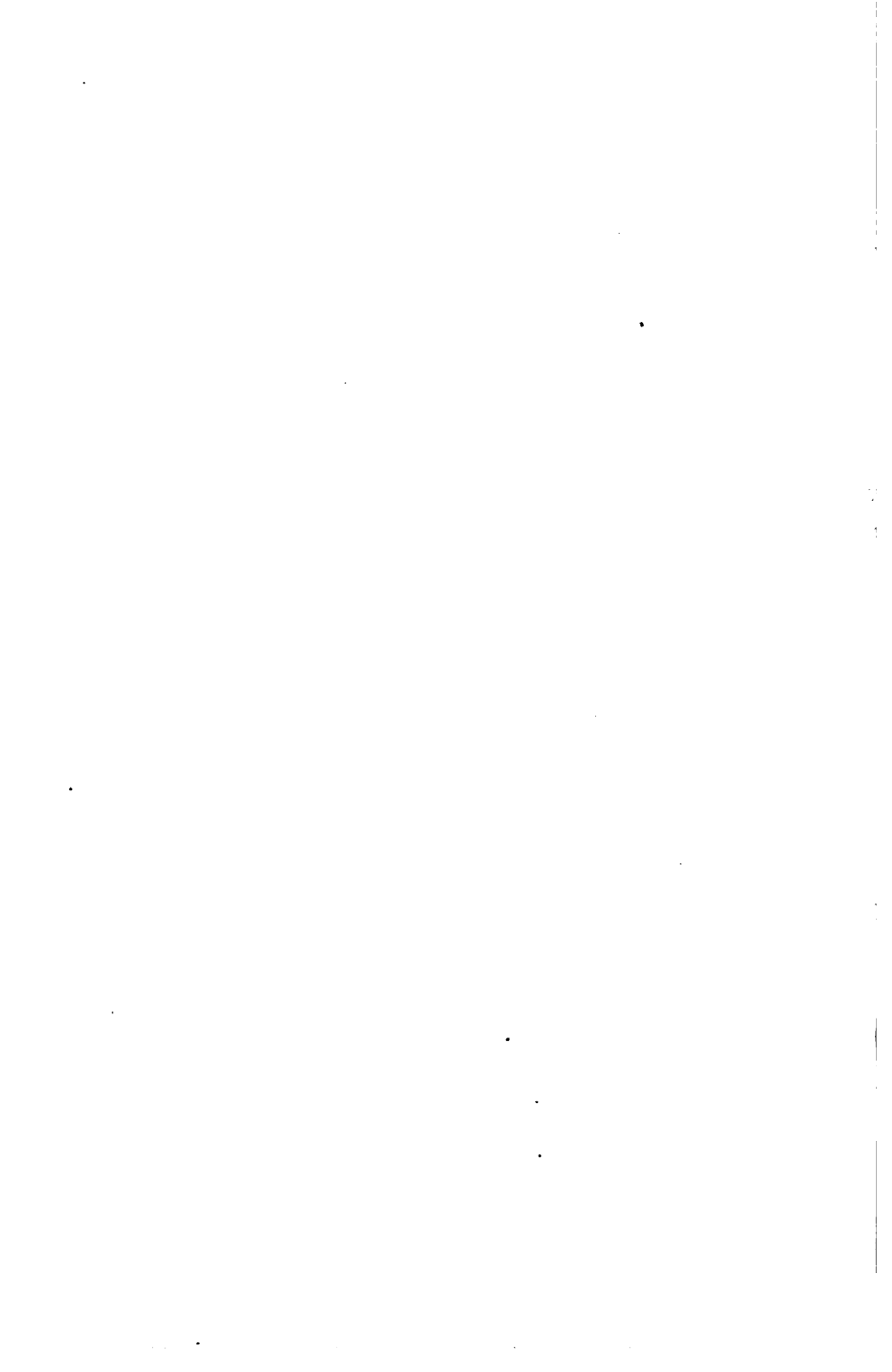
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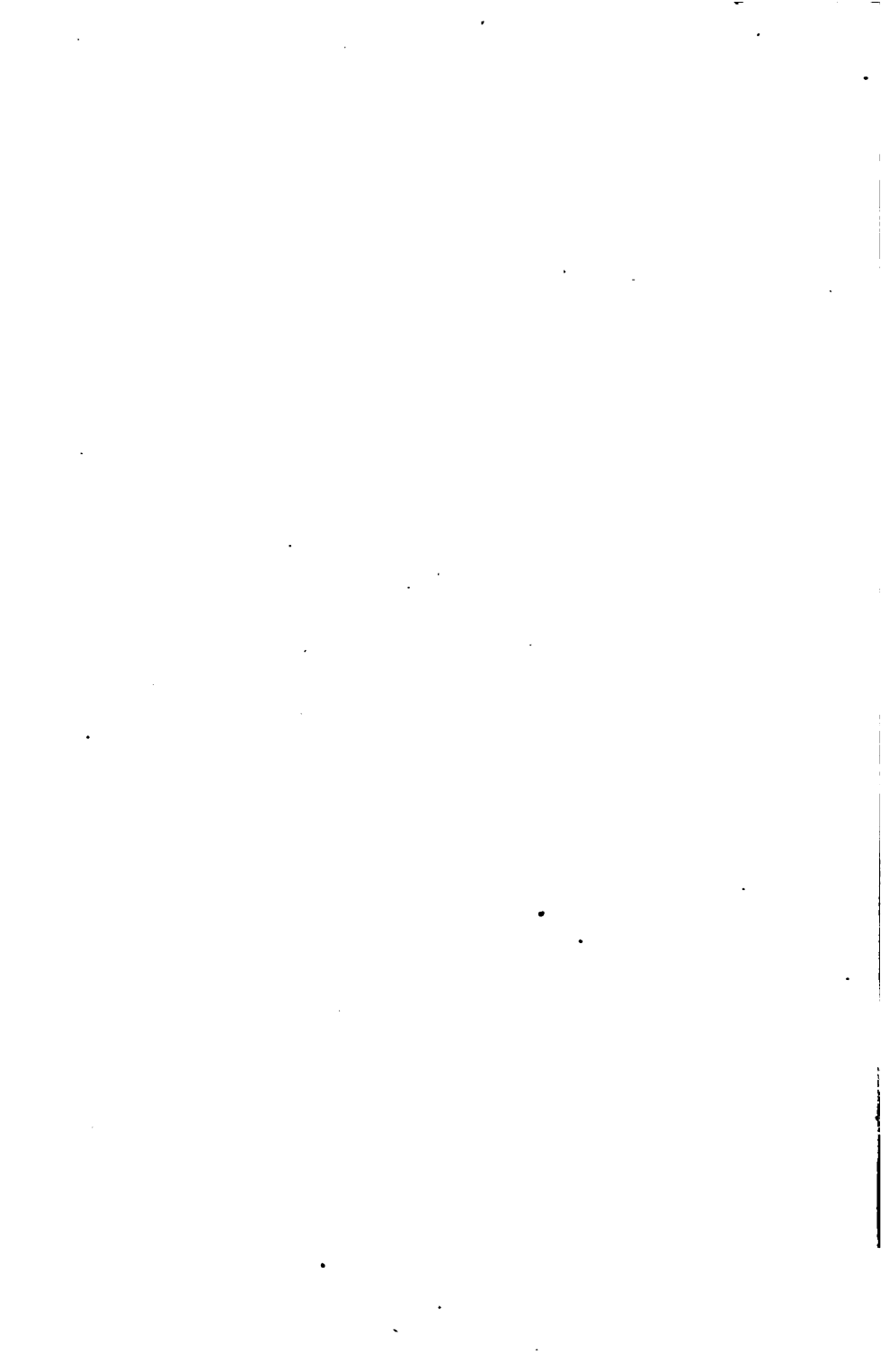














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